COTTON

A MONTHLY TECHNICAL JOURNAL DEVOTED TO COTTON ITS UTILIZATION AND PRODUCTS.

VOL. XIV. ATLANTA, GA., APRIL, 1907. No. 5.

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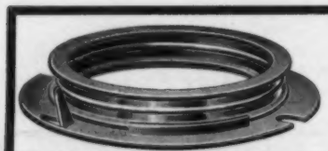

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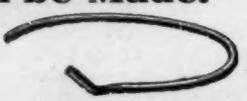

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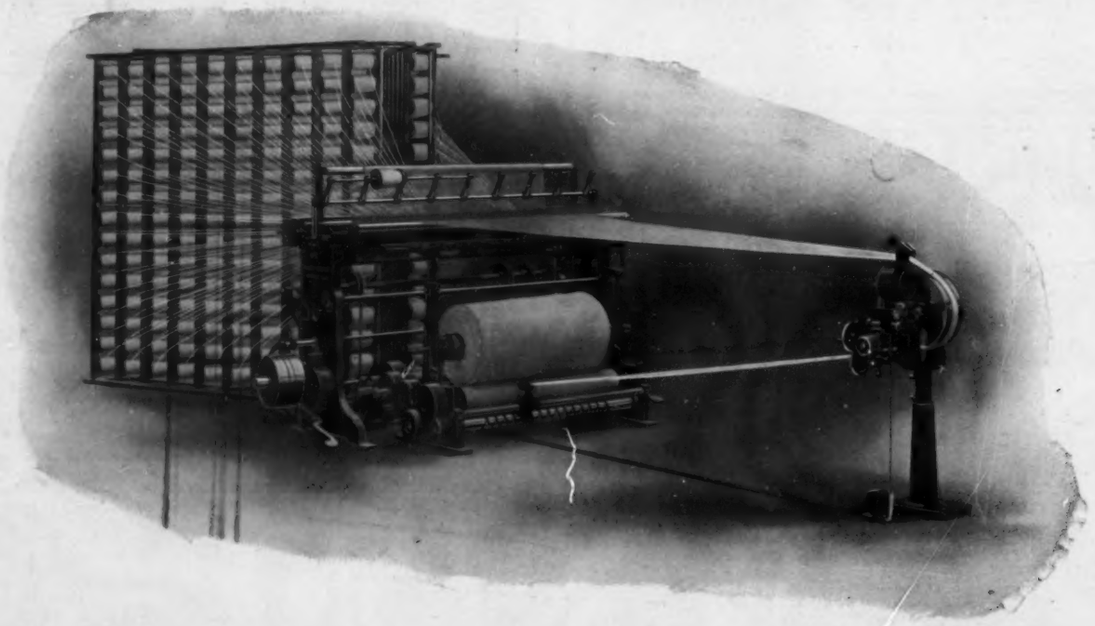

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COTTON

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WITH THE PUBLISHERS.

Since the last issue of COTTON came from the presses, the publishers have received many expressions of appreciation from our readers; some advertisers, too, have taken occasion to commend the new arrangement of the advertising pages and the improved typographical appearance.

A number of mill owners, operators and superintendents have geerously outlined to us what discussions in their opinion would be most interesting and valuable to them and their operatives. Several advertisers have offered kindly suggestions, and altogether, the new owners of COTTON have received from many sources gratifying evidences of interest in the welfare of the publication.

In the first three days of week of April 6th, our subscription department received 66 ne wand renewal yearly subscriptions, and during the same period this department received requests for sample copies to be sent to 286 names of superintendents, overseers, purchasing agents and chief engineers. The requests for sending of sample copies were signed in almost every instance by the president or other officer of the mill.

In all this correspondence, there is just one discordant note. From the president of one mill in Augusta, Ga., we have the following: "We do not care to accept your proposition and will ask you to discontinue sending the copy of your paper which has been mailed to us. We have indicated as much by our refusal of the paper." Short and terse and strictly to the point.

How, in this day, when every man recognizes the value of the press as a disseminator of knwoledge, can the president of a great mill upon whose economical operation the payment of his diivdends must depend, how can he refuse with such emphasis the help which a periodical published in the interest of his business can give? In every textile plant the minds of the capable operatives are constantly evolving improved methods, short cuts for doing work and plans for saving time and labor. In scores of the world's manufacturing plants millions of capital are invested to aid the brains of men constantly and successfully seeking to produce mechanisms, machines and processes that will accomplish more economically the work of the textile factory.

The resultant of all this labor finds its way to the mill owner and manager through, and only through, the textile rpess. It is universally recognized that the popular press is totally incapable of printing technical matter with even an approach to accuracy. Yet this official prefers to operate his plant with the assistance only of his own small circle of employes and without the help of the best thought of a world of thinkers and doers.

In this issue we offer our readers the beginning of a long series of discussions by E. A. Posselt. Mr. Posselt is too well known to textile men to need an introduction. Hundreds of men in active textile work today would count their libraries incomplete without a list of his many published works.

N. L. Willett continues his article on "Varieties of Cotton."

Our dyeing department will again be found full of interest to every mill that has its own dyeing department.

Some thirty pages in all represent the labor of our editor.

Again we ask our readers to continue their kindly criticisms and statement of their wants.

NORTH CAROLINA CHILD LABOR LAW.

The Child Labor Law as passed by the legislature of North Carolina and which is to become effective Jan. 1, 1908, is as follows:

Section 1. That no child under 12 years of age shall be employed or work in any factory or manufacturing establishment in this State. Provided, that after 1907, no child between the ages of 12 and 13 years of age shall be employed or work in any factory except in apprenticeship capacity, and only then after having attended school four months in the preceding twelve months.

Sec. 2. That not exceeding 60 hours shall constitute a week's work, in all factories and manufacturing establishments in this State, and no persons under 18 years of age shall be required to work in such factories or establishments a longer period than 66 hours in one week. Provided, that this section shall apply to engineers, firemen, machinists, superintendents, overseers, section and yard hands, officemen, watchmen or repairers of breakdowns.

Sec. 3. All parents or persons standing in relation to parent, upon hiring their children to any factory or manufacturing establishment, shall furnish such establishment with a written statement, of the age of such child or children being so hired, and certificate of school attendance; and any parent or person standing in the relation of parent to such child or children, who shall in such written statement, misstate the age of such child or children being so employed, or their school attendance, shall be guilty of a misdemeanor, and upon conviction shall be punished at the discretion of the court. Any mill owner, superintendent, or manufacturing establishment, who shall knowingly or wilfully violate the provisions of this act shall be guilty of a misdemeanor and upon conviction shall be punished at the discretion of the court.

Sec. 4. After 1907 no boy or girl under 14 years old shall work in a factory between the hours of 8 p. m. and 5 a. m.

Sec. 5. This act shall be in force from and after January 1, 1908.

ADVANCE IN PRICE OF HOSIERY.

At a meeting of the officers and executive committee of the National Association of Hosiery Manufacturers, held in Philadelphia March 22 and 23, full arrangements were consummated for the third annual convention and exhibition, which will be held in Philadelphia May 13th to 18th; the convention lasting three days and the exhibition lasting through the entire week.

In addition to arranging for the convention and exhibition a great deal of time during the conference was devoted to the question of ways and means for bettering the hosiery manufacturers' conditions, and naturally the question of prices was given the greatest prominence, for the reason that prices on hosiery have not been advanced as conditions have warranted. In addition to a line of work which was decided upon looking towards improved conditions as regards price, full particulars of which will be furnished every hosiery manufacturer in the country, the following statement was given out for publication:

After a two days' session of the officers and executive committee of the National Association of Hosiery Manufacturers, they have recommended to the members of the Association that a minimum advance of 15 per cent. be made on all lines of hosiery.

This step has been made necessary on account of the tremendous advances in yarns, cost of labor, and decreased production owing to the scarcity of labor. Hosiery is the last item of cotton goods to feel the touch of prosperity, as other fabrics have already advanced from 50 per cent to 80 per cent.

The recent failure of two very large knitting concerns has brought home to the hosiery manufacturers the absolute necessity of making the above advance, which is recommended by the executive committee.

While, of course, no concerted action has been taken to enforce this proposed advance, yet many members of the Association have decided to take the initiative regardless of action of other mills. They feel that at present prices they are not making the profit they should from their investments and labor expended, and realize that until the Association becomes stronger, through the addition of many of the outside mills to membership, they must in a measure protect their own interests, and certainly they can find no more potent method than in advancing their price. It was also the opinion of the officers and executive committee that where a manufacturer owns yarns purchased before the advance (and very few are in that fortunate position) he is entitled to the profits accruing from his forethought, and should certainly base his present cost of yarn on today's market, not only that he may realize the profits to which he is entitled, but that other manufacturers who are buying their present requirements at today's prices may not be compelled to sell their goods below cost in competition with the manufacturer possessing old yarn contracts.

ATLANTA AIDS IMMIGRATION.

Atlanta's interests in the matter of immigration was increased to over $4,000 at a recent meeting of business men. This is four-fifths of the amount to be raised by the city. The meeting was characteristic of those being held throughout the State and in the South generally. All the speakers were very enthusiastic over what has been accomplished and the prospects for the early arrival of a goodly number of desirable immigrants.

Hon. Hoke Smith, governor-elect of Georgia, stated that the bringing of more white people to Georgia and the entire South was a matter of great importance to the best interests of this section. Captain J. W. English pointed out the great hindrance to development, due to a lack of reliable labor. He believes that the South has the opportunity of securing what it needs most, and urged that quick action be taken.

General Agent J. B. S. Thompson, of the Southern Railway, said that he had taken particular pains to investigate the need of immigration, and found that it was needed everywhere. It is needed alike in the cotton fields and cotton mills, in the country districts as well as in the cities.

Secretary W. G. Cooper, of the Atlanta chamber of commerce, spoke on the need for more laborers, tradesmen and workers of every kind, of the present scarcity of labor and the many mills and factories and other industries which were unable to do all that they wished to, because of the inability to secure the number of hands needed. Louis Gholstin told how contractors suffered from lack of the right kind of labor, the kind of men that could be depended on to work every day and make it possible for a contractor to figure on big contracts.

John A. Betjeman, chairman of the State executive committee of the Georgia Immigration association, stated that there seemed to be an impression that the ruling of the courts to the effect that no state in the union could prepay the passage of immigrants would injure the work of the association. He insisted that this ruling would not affect the work or the plans now under way for bringing more of the best kind of white settlers.

Those having the matter of bringing immigrants to Georgia and the South were of the opinion that this matter of bringing over settlers and paying their passage would result in the bringing over of many who were not desirable. On the other hand, it was only natural to suppose that any man or family that had enough money to pay their own pasage had made it through just the kind of thrift and hard work that would make them good settlers.

When the work of bringing immigrants to the South was first contemplated, it was readily realized that a large amount of money would be needed to start the work. It was also decided that the best results would be accomplished by bringing these newcomers direct to Southern ports. In this way immigrants would not be brought in contact with agents and commissioners of Western States, railroads and land companies, who were quick to promise everything to further their own needs.

As a result of the recent Macon conference, it was decided to secure the co-operation of some of the large trans-Atlantic steamship companies to so equip their present freight ships as to permit the carrying of passengers as well as freight. This was placed in the hands of business men, and, within a month or two, the first steamship inaugurating a regular service between a German and a Georgia port will arrive in Savannah. After this, regular ships will follow, together with irregular sailings from ports in the United Kingdom and Italy, with the best of immigrants from these countries.

SOUTHERN SPINNERS TAKE ACTION TO IMPROVE SHIPPING CONDITIONS.

Inability of the railroads to furnish cars for cotton has led the cotton spinners of North and South Carolina to pass resolutions demanding that buyers specify on their bills of lading that shipments are actually in the cars before drafts for their payments are honored. The co-operation of the spinners of the entire country is asked. At a meeting of the cotton manufacturers of the States mentioned the following resolutions were unanimously adopted:

Whereas: Grave irregularities exist in the shipment of cotton, entailing heavy financial loss and inconvenience to spinners, bills of lading being drawn omitting all car numbers and initials, rendering them useless for tracing or locating lost or strayed shipments, cotton actually remaining at initial place of movement two or three months before being finally loaded, getting water soaked before being compressed and otherwise carelessly and negligently handled. And

Whereas: Demand drafts being promptly drawn on these incomplete bills of lading presented for payment to said spinners who are thus placed at great expense and loss in having to settle same two or three months before receipt of cotton; said evils have become so great that cotton can be ordered from Egypt and received quicker and with no annoyance. Therefore, be it

Resolved, That the said evils existing be respectfully called to the attention, and the earnest co-operation of the American Cotton Manufacturers' Association, the National Association of Cotton Manufacturers, the Cotton Manufacturers' Association of South Carolina, the Cotton Manufacturers' Association of North Carolina, and the Georgia Cotton Manufacturers' Association, and the Cotton Manufacturers' Association of Alabama, to the end that the said evils be remedied as set forth herein. And, be it further

Resolved, That with the opening of the cotton season of 1907-1908, said spinners decline to honor drafts unless accompanied by bills of lading covering cotton actually in cars, and containing car numbers, said car numbers covering cars actually holding said cotton as represented by bills of lading.
said cotton as represented by bills of lading. And, be it further

Resolved, That no draft be honored, regardless of car numbers being furnished on bills of lading, where shippers resort to split shipments of less than solid cars, where the purchase amounts to as much as a solid car. And, be it further

Resolved, That where cotton is sold landed all freight shall be prepaid by the shipper. And, be it further

Resolved, That copies of these resolutions be furnished to the press, and to any shipper of cotton upon request.

AMERICA'S FIRST COTTON FACTORY.

As apropos of the coming national meeting of the American Cotton Manufacturers' Association, which will be in Philadelphia next May, it is interesting to note that the individual who built the original cotton mill in the South was a Philadelphian. Though born in Lancaster, Lancaster county, Pennsylvania, he spent much of his life in the Quaker City in the tailoring business. It is quite appropriate, therefore, that the Manufacturers' Association should select Philadelphia as the place to assemble.

Michael Schenck is the pioneer manufacturer who started in Dixie an industry that at the present time represents an investment of nearly $650,000,000. He was born in the Pennsylvania Dutch city of Lancaster, February 15, 1771, having been descended from a Swiss Trennonite family which emigrated to the United States in the latter part of the seventeenth century, after making an agreement with William Penn for the purchase of land in Lancaster county.

Schenck came to Philadelphia early in life and engaged in merchant tailoring, in which he successfully spent several years. His health failing him, he went to Lincolnton, North Carolina, with two of his brothers.

He constructed a mill a short distance east of town, in which were placed seventy-two spindles, which was operated with water power. His goods were all purchased in the Quaker City and Lancaster, and were transported to Lincolnton in wagons. Schenck's little establishment, which commenced to run in August, 1815, proved so profitable that four years later he installed in it 3,000 additional spindles. Out of it has grown the vast cotton mills that are now producing millions of dollars worth of the fleecy staple and shipping it to every section of the civilized world.

COTTONS IN CHINA.

According to a late consular report there is a great revival of business in the Shanghai piece-goods market. Clearances of all classes of goods has greatly improved, and there is an active speculative inquiry for both spot and forward cargo. Tientsin is primarily responsible for this demand, but it extends to other markets also, and for many of the staple English makes importers are able to obtain replacing cost.

INDIA'S COTTON CROP.

The final general memorandum of the Indian cotton crop of the season 1906-7 has been issued by the government of British India, the following being its main features:

The total area in all territories reported on is now computed as 22,344,000 acres, which marks a net advance of 1,272,000 acres, or 6 per cent on the final figure for the previous season. The total estimated outturn amounts to 4,908,000 bales of 400 pounds, the increase in this case being one of 1,482,000 bales, or 43.3 per cent. Yields of previous years were: In 1905-6, 3,240,000 bales; in 1904-5, 3,818,000 bales; and in 1903-4, 3,168,000 bales. An Indian bale weighs 100 pounds less than an average American bale.

The character of the season has been generally favorable, though the crop has suffered from disease and insects in various quarters. The condition of the crop is reported to be good on the whole.

FACTORY VENTILATION.

The subject of shop and factory ventilation is given about as little attention by the average manufacturer as were sanitary conveniences in manufacturing establishments twenty years ago. Water was as cheap then as it is today, but suitable means for

using it conveniently were not provided. Manufacturers have realized that cleanliness in the shop and a certain amount of convenience for workmen have resulted in increasing the output at a surprisingly low cost.

Fresh air is cheaper than water and may be obtained in unlimited quantities almost without cost. When erecting new buildings but slight expense need be incurred for obtaining ample ventilation, and what expense is necessary is merely for means for producing circulation. This in the majority of cases does not involve the use of fans or blowers, since in one story buildings sufficient velocity of air can be obtained by merely providing a direct vent for the escape of heated air lying next to the ceiling or roof. Notwithstanding the simplicity and inexpensiveness of such an arrangement many new shops are to be found without provisions being made for an adequate supply of fresh air.

Two hundred cubic feet of air an hour for each person is about the minimum in order to prevent ill effects likely to be produced by breathing vitiated air. When smoke or other gases pollute the atmosphere of work rooms, from 400 to 600 cubic feet will be required. An additional 40 cubic feet an hour, as the minimum, should be provided for each gas jet or other open flame. In a room containing twenty workmen, each provided with a gas jet, this would necessitate a supply of 4,800 cubic feet of fresh air an hour. In machine shops where oil is used and more or less dust is constantly rising twice this amount should be provided.

In order to maintain proper temperature both the inlet and outlet for air should be adjustable so that the maximum circulation may be obtained without lowering the temperature below that required. Many shops employing say, twenty men, contain facilities for admitting and heating 10,000 cubic feet of air an hour, but scarcely any provision is made for permitting the escape of an equal volume of foul air. Drowsiness produced by breathing impure air has a marked effect upon the agility of the workman and this, in turn, influences the output.

Lack of ample ventilation is not the result of inability to procure suitable appliances at moderate cost, but to the fact that managers and superintendents fail to realize the difference between the productiveness of a well-ventilated and properly warmed shop and that of a cold one filled with foul air. If expensive ventilating systems prove to be a paying investment in large shops, a less costly, but equally efficient, means will pay in small shops, because men are men and their needs are the same whether the shop be large or small.

IMMIGRATION.

Noting that the legislature of Missouri is considering making an appropriation of $50,000 to maintain agents in Europe to induce immigrants of the right kind to go to that state, the Boston Traveler says:

"The decision of Secretary of Commerce and Labor Straus, admitting alien contract laborers to the mills of South Carolina, who were brought to this country by an official agent of the state, sent to Europe for this purpose, is having its inevitable and expected effect. The contract labor law, since its passage in 1885, has been a good deal of a farce. While it has to some extent scared employers from bringing in foreign laborers by the wholesale, it has been evaded constantly since its passage. If its interpretation in the South Carolina case is allowed to stand, it might as well be repealed for all the future benefit it will bring to labor."

While the marvelous industrial activity in the South has added to the total of the country's wealth and prosperity, conditions are such that Massachusetts is one state that has felt ill effects because of it. Cotton mills have been moved to the South from Massachusetts and money from that State has been and is being invested in manufacturing there. It is another inevitable thing that the cotton mills must come to the cotton rows. It was the result of the lack of industrial development that any of them were ever located elsewhere.

The South does not want and does not expect to secure undesirable immigrants. No section of the country has put into practice such determined ideas upon the subject as this section entertains and is preparing to apply.

THE LEADING TYPES OF COTTON GROWN IN THE SOUTH TODAY AND DESCRIPTION OF EACH.

N. L. Willet.

Excelsior Prolific Cotton. Short staple. Originated in South Carolina. Short limbs, bearing bolls of high percentage. Plant is one of the tallest in the cotton tribe; is quite shapely and few fields of cotton present a handsomer appearance than Excelsior fields. Has ranked first, and then second, at the North Carolina Experiment Station—yielding 1,761 and then 1,757 pounds of cotton seed to the acre. Ranked first, also, at Clemson College, S. C., first at the Arkansas Experiment Station, and won a gold medal at the Charleston Exposition. Seventy-seven bolls make one pound of seed cotton. It has a long tap root; withstands droughts; fruits closely. A cut before me, nine inches long, shows 13 open bolls. Twelve of the seed are naked and black, the remainder are mixed gray brown and green, fuzzy. It is medium late. The yield from the oil is small, a little over 37 per cent, whereas the usual percentage is 38 to 41.

Hardin Prolific Cotton.—Short staple. Originated in Georiga several years ago. So far as I know it has not been tested at Experiment Stations. The originator has introduced it by exhibiting it at fairs and on the streets in city by personally showing several stalks, which he carried around by hand. It creates a sensation wherever shown. The whole stalk seems to be literally a big, white, open, fluffy boll. The bolls are exceedingly wide and scarcely show the locks at all. The originator, in his exhibitions, has had for several years no trouble in getting $3.00 a bushel wherever he has shown his stalks. The boll is medium; the stalk is medium tall in size—large limbs at the bottom with the balance of the stalk having short limbs. All limbs seem to cease something like a foot from the apex. It has exceedingly trim stalks and no surplus foliage. One very striking peculiarity is that at the top of the stalk and above all the limbs, it fruits very heavily and directly from the stem itself. This presenting quite an original and striking appearance, for it rarely occurs that cotton plants fruit to any extent above the limbs and up to the apex. Often the very apex of the stalks of Hardin is a fruit bearer. The seeds are exceedingly small and appear somewhat mixed, some are whitish, some brownish, while some are quite green. There is an occasional black bare seed among them—possibly 5 to 7 per cent. The cotton in the field is very prolific. We grew, on the writer's farm in 1905, planting May 20th, and matured a heavier first crop than of any other varieties grown; we also made a top crop, producing in all 1¾ bales to the acre and not on extra land. Many of the largest and most scientific planters in this country, after testing Hardin in 1905, planted it exclusively in 1906. Some of them made over a bale to the acre this past year, when only 60 per cent of a crop was made in the neighborhood.

Bates; Bates Vistor; Brown Seed Peterkin.—This cotton is known by all of these names. It originated in South Carolina. It yields 42 to 46 per cent of lint at the gin per hundred pounds of seed cotton. It is of the peterkin type. It was exhibited at the Paris Exposition. One stalk at the Augusta Exposition in 1891, in the writer's possession showed 681 open, well developed bolls on it. It is a late cotton. It takes over 100 bolls to make

one pound of seed cotton. The cotton has been experimented with but little at the various Experiment Stations, but it is in large use in the Augusta territory. The stalk is compact and the branching limbs grow close together, up and down on the main stem all the way around. The bolls are close together on the limbs. It is prolific; not subject to dry forms; staple is coarse and wirey. The seed is round and perhaps the smallest of any known variety—weighing only a little over a grain per seed. It usually takes 18,000 seed to weigh one pound. The color of the seed is a dusty brownish green with an occasional black seed. It does not open prematurely. It has little trash on the bolls; picks easily and clean of trash. Lint does not blow out by rains and winds and sits in a stiff, fluffy, clump on top of the bolls, which mostly stand upward instead of downward on the stalk.

Hawkins. Short staple. Originated in Georgia. Semi-cluster variety. 35 per cent out by September 1st. Medium boll —77 weighing a pound; average stalk three feet high, three large limbs at the bottom. It is a tall grower; has a long tap root resisting drought; small seed, some light gray, some green, 35 to 40 per cent. This is an old established, most desirable cotton, well adapted to all soils. Yield at Geargia Experiment Station 2,105 pounds, cotton in the seed per acre, or 675 pounds of lint. 5636 seed make one pound of cotton seed.

It was distributed many years by the United States Government in their free seeds. The general average in the various "points" in cotton, in Hawkins is high. The Georgia Experiment Station in one report makes Hawkins, out of fifteen cotton tested, third in yield of seed cotton per acre fourth in yield of lint per acre; third in yield of seed per acre; eighth in yield of line per cwt., of seed cotton; fifth in weight of bolls, fifteenth in size of seed, second in earliness, third in value of total product of lint and seed.

EXPERIENCES OF A COTTON MILL MASTER MECHANIC.

The value of having up-to-date plans of all underground piping systems in manufacturing plants is a detail very little thought of or cared for by most managers, although it is a vital necessity where efficient service is desired. Lack of attention on this point has often caused serious inconvenience, frequently extra expense and occasionally a great deal of both. The writer was once talking with a friend who was manager of a large print works in the East, and the conversation naturally was of men and things mechanical. He finally spoke of the master mechanic of his plant, and said that while he was an old "fossil" he had been at that plant 23 years and he, the manager), could not afford to change him, because no one else knew where to find the "miles" of pipe that were buried all over the place. What he would have done had the man died is a matter for conjecture.

Nearly all textile plants are insured by one or more of the factory insurance companies. These companies always have a plan of the fire system of piping made by one of their own men, a copy of which they keep at the plant. In one plant where the writer was employed, this plan was the only one on the place. Shortly after my arrival the plan was given me, together with a letter of instructions from the insurance company, requesting the installation of a post indicator valve on one of the pipes, shown at *A*. The sketch shows a section of the plan only. Men were put to digging as near the indicated point as could be measured, but after digging a cross ditch 10 feet deep and 12 feet long and finding no pipe, it was decided to prospect a little. So a series of holes and ditches were dug and when we finally found an 8-inch cast iron pipe we were happy. As there were no other 8-inch pipes in this part of the yard, the writer felt safe enough in having this one dug out to a joint, cut off and the valve leaded on.

As the job was finished late at night, it was tested for tight joints and left until morning. When the trial was made the next day, the water came just the same with the valve shut as it did when open, and further investigation showed that we had the valve on the pipe carrying water to the sprinklers in one of the buildings, at *B*. Further inquiry developed the fact that when the contractors put in the sprinkler system they had substituted 8-inch pipe for 4-inch pipe at this place for some unknown reason, and, as the insurance company's draftsman was not equipped with an X-ray machine, he inferred that the 4-inch riser came from a 4-inch pipe as per plan, and so made no change. The next thing was to find the other pipe. Sinking a cross ditch from the pipe at *B* the pipe *A* was found 4 feet distant, as shown at *C*, the dotted lines indicate the true position of the pipe. As the distance from the building *D* to the hydrant house *H* was 52 feet, there was quite a lot of ground to be dug up in doing this locating.

Once when installing a new power plant in a factory already in operation after the plans had been made and excavation begun for the boiler house, the floor of which was to be 6 feet below grade, a 12-inch sewer pipe was found running across the corner of the building. This had to be moved, causing delay and extra expense. At another plant the original blueprints used in the construction of the plant were available, but a few months'

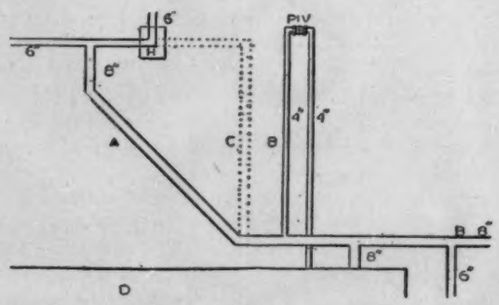


DIAGRAM SHOWING LOCATION OF PIPING.

experience showed them to be worse than useless, because where they indicated valves there generally were none, and where one least expected to find valves, there they were to be found. Pipes shown on the plan to be 10 inches were found in places to be 4 inches, while some of the pipes on the plan had never been installed. In other places on the same water system there were 12-inch pipes of which there was no record.

On one occasion an 8-inch terra cotta sewer got stopped up and as it was under ground for several hundred feet the plugged up place had to be located. Two points on this line had been found and one a little further down desired, but after digging for over a day with two men and finding no pipe, another scheme was tried. Three men had helped to put in the sewer, and as each one indicated a different location for it, I allowed each man a chance at the digging. As each one was still certain his location was the right one I let them take some augers about 2 inches in diameter and extending the shanks they answered very well to bore test holes. Then each man selected his locality and bored holes until he hit something, when it was dug up and inspected. This plan finally located the pipe.

Some cotton bales from the Mississippi valley contain a thousand pounds of lint, and some bales weight as much as 1,300 pounds. This large amount of cotton in a bale is for the purpose of reducing the levee tax which is $1 a bale independent of size.

THE MANUFACTURE OF DYED COTTON.

In a great many instances in the manufacture of colored cotton yarns, it is economy to spin the yarn from cotton dyed in the raw stock, rather than dyeing the grey yarn, more especially is this the case with reference to yarn to be used for filling, than for warp yarns, as in dyeing yarn to be used for filling, it has to be afterwards wound on filling bobbins, which in itself is a rather tedious and expensive operation to the mill, besides if the yarn is tangled or broken in the dyeing and drying processes, which is very often the case, a considerable amount of waste is made with its consequent loss to the mill.

Colored cotton, when properly handled in the several processes, will be found to work nearly as well and with very little more trouble than when carded in its natural state. If the stock is in good condition and proper attention given the machines, light colors, such as tan, pink, light blue, grey, yellow, etc., etc., should give as little trouble as white, while in dark colors, difficulty will be encountered in the several processes.

Each color, according to its nature, has a different effect on the cotton fibre, since the process of dyeing and drying it changes the condition of the fibre more or less, according to the nature of the dyestuffs used. Some dyes give to the cotton a somewhat harsh feel, while others without making it harsh, will more or less mat the fibres together, while other dyes in turn will leave the cotton light and flimsy.

In practice, it will be found that these different conditions will cause variations in the weight of the roving or yarn, as the case may be.

Different colors of roving may be run on the same spinning frame, but will not produce exactly the same count of yarn, for the fact that the dye which produces a compact and solid roving will retain all its fibres as well as all the dye and dirt, which has not been carded out, and consequently will weigh heavier with a given draft than might be expected, although the yarn will appear finer twisted than usual, while with colors that produce a soft and fleecy feel in the fibre, it has the opposite tendency, that is to make the yarn light, from the same weight of roving because the fibres fly off during the process of carding and subsequent processes, the roving in turn being so open and light, that the lightest dirt and dust will fall out in drawing and twisting, and the yarn in turn be lighter in count.

Changes in temperature, the time that elapses between drying and carding, as well as the manner in which it has been handled at bleaching or dyeing, drying, etc., frequently are the cause for bad carding, compared to similar quality of cotton carded in its natural state and which is more easily carded and spun on account of the oil the cotton possesses in its natural condition. Since bleached and colored cottons absorb moisture more readily than in its natural state, a continuous moderate temperature is required for carding, as well as spinning them.

Although good light is essential for carding, yet intense light is injurious to colored work. Solid colors will stand light better, whereas mixtures will cause trouble, since the lighter color has a tendency to fly from the darker, intense rays of light as well as heat increasing the attractive power which draws them apart. Colored window curtains or frosted glass will subdue the force of intense light, assisting in better carding, besides preserving the color (gloss) of the cotton. All conditions which make poor work in connection with carding cotton in its natural state will act with so much more force in a mill running on colored work. In dyeing cotton to be carded, care must be exercised to have the fibres free and devoid of stickiness, so that they will not get broken, besides losing portions of coloring matter during carding. Bleached or dyed cotton after drying should be stored loosely and at a temperature of 65 degrees for about 10 days before using, in order to absorb the proper amount of moisture and thus be brought as near as possible to its natural state. If colored cotton is carded when too dry, much of the coloring matter will be thrown off, giving in turn a dull and faded appearance to the yarn, besides giving rise to the generation of electricity, hence poor carding. The doffer comb will fail to strip the doffer properly, and the parallelization of the fibres is affected by the electricity which causes some of them to stand out straight from the silver instead of lying parallel.

As a general rule, there is less loss of fibre in spinning colored cotton than white, however, the spinning frame should be frequently cleaned and the rolls carefully attended to, since dyestuff will more or less come off and deposit itself on the rollers, get under the saddles, etc., and soon dry up the oil, hence the importance of proper lubrication of the rolls. It may be thought, that, because the cotton is colored, a little carelessness in the cleaning of the machines will not be noticed, which, however, is an incorrect idea, since the cleaner the machines are kept, the better the work will run. Dust and dirt accumulate very rapidly, especially on coarse work, and often it will be found that the bolster rail of the ring frame carries a great quantity of dyestuff, which in turn works down into the bolster, thus rendering the revolution of the spindles more difficult, or retarding the motion of the same, being features which add to the coal bill, since a quantity of dyestuff deposited on the rolls or any other moving parts of the machine is apt to interfere more with the proper running of the machine than would the same amount of dirt.

The amount of twist required in the yarn is another matter which requires careful consideration. Dyeing raw cotton diminishes the strength of the fibres, and for this reason, yarn spun from cotton dyed in the raw stock requires somewhat more twist than yarn spun from white cotton. The oil or cotton wax, on the fibre of the natural cotton, and which enables the fabrics to be more easily drawn out and arranged in a parallel line, is removed in the dyeing process, this loss of strength and adhesive power of the fibres accounting for the necessity of having to use more twist in the yarn as compared to the same cotton spun in its natural state.

If, however, it is found that the yarn has retained an excessive amount of dyestuff, care must be taken not to twist it hard enough so as to give it a harsh and wirey feel, as this kind of yarn, if allowed to run on, will detract from the value and safe of the yarn or cloth woven from it.

Again, if the yarn has too much twist and at the same time is very uneven, it is apt to cause snarls and bunches in the yarn, and as it passes through the traveler, these bunches are momentarily arrested, more so if the traveler is worn or of a light weight.

The whipping together of the threads, shortly after the frame is doffed, is a difficulty which requires some consideration. If a frame is changed from white to colored work, considering that the same hank roving is used and no alterations made in the draft gear or traveler, but on account of it being colored, a little more twist simply put in, it will be noticed that when the frame has been running a short while, the ends will strike together and break down very fast, while with the corresponding yarn spun in the gray, no trouble of this character was experienced. This trouble is caused by the extra amount of twist being put in the yarn and which gives the traveler more turns per minute and consequently increases the balooning of the thread.

With separators, this difficulty is overcome, and for which reason, these useful adjuncts to ring frames are prized highly by those who had to spin yarn previously without them. Substituting a somewhat heavier traveler in place of the one in use, in most instances will assist in overcoming this difficulty. Reducing the speed of the spinning frame by means of partially shift-

ing the belt to the loose pulley, as is sometimes done, during the period of greatest severity, i. e., starting the frame after doffing, will eliminate the trouble; however, such a procedure is not desirable to be resorted to, on account of reducing production correspondingly. If the ring rail be made to travel a little faster, this might also help matters some.

Again, the ends lashing together and breaking down, may be caused by uneven roving, the light places in the yarn being then temporarily arrested by the traveler, and thus give a jerking motion to the thread, in turn causing it to swell out and strike the one ballooning next to it, and on account of it being weak will be unable to stand this strain, and consequently break down.

A difference in roving will also cause a change in the running of the work, for instance, the frame may be running all right until a new lot of roving is put in, when then, although there is no difference in weight, the ends will strike together and break down. The cause of this change may be that the stock is of a different dyeing, which may not have left it in the same condition as the batch previously treated, again, the stock itself may be poorer, caused by the cotton being of a lower grade, shorter staple, or again,. the preparatory process may have been neglected, and when in turn the yarn will be found unable to withstand the strain, previously referred to. If more twist is put in the yarn, the speed of the traveler is thereby increased and which may help matters some.

A good arrangement on spinning frames, not provided with separators, for counteracting the ballooning of the thread and thus preventing them from whipping together, is to have a wire strung from one end of the frame to the other, at a suitable distance behind the bobbins, and with which wire the thread will come in contact with, a feature which in turn will break extreme ballooning of the thread. This wire should be supported at several different points and be arranged in such a manner that it can be moved closer to the threads, if desored, when the bobbins are small and gradually moved at intervals to suit the requirements, as bobbins are gradually built up, and finally set out of the way entirely when it becomes unnecessary. While this device is not so convenient and satisfactory as separators, it is easily applied and will save the overseer lots of trouble, labor and bad work.

If the ends break down too often at the beginning of the bobbin, the traveler is then probably too heavy for the yarn spun, or the traveler is worn. In this connection, it must be remembered that the traveler does not maintain the same point of contact with the ring at all times, and a traveler which would run all right when near the bottom, might have friction enough to break the thread when near the top. Again, there might also be a slight vibration of the ring rail when near the top of the bobbin, a feature which will produce an additional strain on the yarn and be the cause of it to break; again, the ring rail may not be perfectly level, and which will cause the same trouble.

Travelers running on colored work will not last as long as such as running on stock in the gray, for which reason, the spinners must be constantly on the lookout for worn travelers, and replace them with new ones. The frame tender, taught the means of detecting bad travelers while the machine is running, will have no difficulty in this respect, as worn travelers are easily singled out by him from the sound ones. Some mills renew the entire lot of travelers on a frame at intervals of about one month, which is a very good plan, and for this reason is practiced by a great many mills, the only objections to it being on the score of economy, since some travelers will wear longer than others, also if frame tenders know that the travelers are removed at stated periods, they are apt to let the bad ones stay on until all are removed.

The ring or traveler should never be oiled. If the traveler does not run properly, it may be caused by the ring being loose, or not set level or possibly the ring may be worn.

The spindles should be set in the center of its mate ring, and the guide wire properly adjusted. All these causes and many more, will tend to keep the ends breaking, leaving the impression that the traveler is the cause of it.

On account of the character of the work, some defects in the yarn will not be noticed, even when it is seen running through the machines, whereas if the yarn was spun in the gray, the remedy would readily be noticed. For example, in setting the rolls, it is harder to see just how the work is running, more especially so if the light is deficient, and which is the case in many mills, hence the importance of the arrangement of the machinery in a colored goods mill, so as to give it the best light possible, will be plainly seen. With the darkness and nature of the work combined, we do not receive as correct an impression as if it were in a well-lighted room and on white work.

A given position of the rolls will not suit best for long at a time, especially if much changing is a necessary part of the work, or where great modifications in the character of the cotton are noted. Still, an overseer cannot reset his rolls every time he makes a slight change in his yarn, or when a new trouble in the roving is observed by him. Defects such as these are a necessary consequence of this kind of work. If these changes occurred at rare intervals, some attention could be given to the matter with considerable advantage to the work, but where frequent change is the rule, such alterations are not expected. It would be advisable to keep certain frames for certain yarns, and in this way minimize the evil. With reference to the setting of the rolls, we must remember that the colored yarn requires a wider separation of the rollers than would be the case on white work, for when the fibres are pressed together they pull apart less easily than on white.

In a great many mills there is more or less trouble with the drawing of the roving, owing to some difficulties or lack of attention in the dyehouse. Too much dye used, cotton insufficiently dried, too much oil or soap on the fibres, such are a few of the many things to provide a spinner with a chance for trouble. It requires but little dampness in the cotton to augment resistance in drawing, and which in turn will be followed by bad work later on.

It will be frequently found that in some mills, the work is run much coarser than the machines were built to handle, for example, the weights used in the drawing process of the roving being much too light and when imperfect and irregular work will result. In such cases, we may have to set the rollers somewhat wider to assist over the difficulty.

It sometimes happens that the cotton is burnt more or less in the dyeing or the drying processes, and when at such times, the skill and ingenuity of the spinner is most taxed, for the fact that no life and vitality remain in the fibre, in consequence of which the ends will not stay up, with the result of a very tender and rotten yarn.

It will be found that doctoring up roving by the carder in order to get it along, will not improve its condition for its spinning.

The carder may have put in more twist in the roving to help himself along, but which will only still further diminish the strength of the fibres. Again the roving may be wound soft or the reverse. If it is wound too soft, it will break frequently, whereas if wound too tight, the fibres are further injured.

When the raw cotton is burnt in the dyeing process, as previously explained, it is very difficult to card, and will cause trouble on all the machines in the room, with the result that the roving, when ready for spinning, is very irregular and uneven, and in extreme cases may be only fit for waste.

However, when poor roving should reach the spinning room,

it remains for the skill and ingenuity of the overseer to make it run as good as possible. If the roving is found very uneven, the overseer may introduce a little more twist in the yarn, which, however, may cause the ends to break down when a light place in the roving is reached, which, however, cannot be avoided, and under these circumstances is the best thing that can be done. If a lighter traveler can be used, it will put less strain on the yarn, and thus keep many ends from breaking, which otherwise would come down. In an instance of this character, it is true economy to reduce the speed of the spinning frame, since this means a partial relief of the strain on the thread, this being the object most sought after; however, the yarn spun from such stock, will in every case be of an inferior grade, and at best it is by no means perfect yarn.

In some instances, we may find two strands of different colored roving run together on the spinning frame, for the purpose of making an imitation of a fancy twist yarn, but this procedure does not give as satisfactory results as when the two threads are twisted together on a twister after being spun, since there will be found a decided absence of the distinct individuality of each color, which is so prominent in the ply yarn, when the colors are spun separate, and afterwards twisted together. If the colors spun together have a marked contrast, fairly good results may be obtained, otherwise the process is more or less a failure. If two pieces of cloth of similar design are placed side by side, one being made of yarn spun double, and the other of yarn doubled after being spun, the superiority of the latter will plainly be seen.

In order to produce good yarn and this of a uniform shade, the work must be started right at the mixing room, so as to lay there the proper foundation for a thorough mixing of the stock, since it is largely on account of the unevenness of the work at this initial process of cotton spinning that lays the foundation for a poor yarn as its final result. Strict attention must be continually paid to the management of the mixing room, since if this is not done the result will be that the work one day will be good and another bad.

The draft is another most important factor, and which on all the machines should be light, especially on the spinning frame, a short draft having a wonderful effect in brightening up the colors, while a long draft makes the thread appear dull and lifeless, even if it is of the same count.

When two rovings are spun together, they are drawn through the rolls side by side, each roving strand preserving its own individuality until it passes through the middle roller. Here the draft begins, and when then the fibres of one strand of roving become more or less intermingled with that of the other, hence the distinctness of each color is lost in that of the other. With a long draft, the fibres in each mass do not lie so closely or compactly together as they do in a shorter draft, which has a great effect in blending the two colors more or less into one, and as previously referred to, in order to get satisfactory results a short draft must be used. However, under the most favorable circumstances it cannot be hoped that the same effect can be produced, as if the yarn were doubled after being spun.

It is not advisable to run the spinning frames at too high a speed if the roving is being doubled, as the centrifugal action of the thread when at a rapid revolution throws out upon its surface a large amount of fibre which is but partially twisted in and gives the yarn a dull and hazy appearance, a feature which when the roving is uneven, or the draft greater than it should be, then the more prominently this will appear.

The New Orleans cotton trade allows only five ounces per bale for sampling. The Maritime Board at New Oryeans fixes the minimum density of a compressed cotton bale at 22 pounds per cubic foot.

AN IMPROVED LUG STRAP.

E. A. POSSELT.

The lug strap is one of the accessories to the loom, which on account of the action to its pickerstick will often wear out, and in this case has to be replaced with a new one, hence is a most important item with reference to the supply account of the mill, for which reason, any improvement in its construction to prolong its life, will be of the greatest interest to mill men.

The accompanying illustrations show us such an improvement to lug straps, and of which Fig. 1 shows us, in its perspective view, besides this lug strap, those portions of a loom to which the same more particularly refers, i. e., the pickerstick and the picker rod. Fig. 2 is a perspective view of the new lug strap, shown on a somewhat larger scale as compared to Fig. 1, so that the reader can grasp its advantage over styles found in general use.

THE OBJECT

aimed at in the construction of the new lug strap is to provide to the latter a detachable buffer or cushion, by means of which the pickerstick is prevented from coming in direct contact with the lug strap, the cushion receiving the force of the blow imparted to the pickerstick, and thus prolings the life of the lug strap as previously referred to.

With reference to letters of reference accompanying our illustrations, the same are selected correspondingly, and of which *a* shows us the pickerrod, *b* the pickerstick, *c* the lug strap and *c'* two slotted holes, one on each end of the sides of the strap, for connecting the latter to the pickerrod; *d* is the buffer or cushion and *e* a flexible sheet metal, provided for retaining the cushion in its proper position in the lug strap.

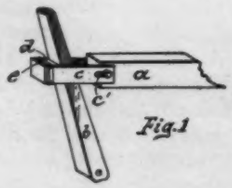


Fig.1

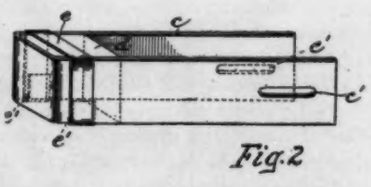


Fig.2

DETAILS OF CONSTRUCTION.

The lug strap is made of one piece of sheet metal, the two ends of which *c'* are slotted in order to fasten to rod *a*, which connects with pick lever of the loom (not shown). The cushion or buffer *d*, and which is a block of felt or some other suitable cushioning material, is placed inside the arms *c* and against the neck of the strap, and consequently forms a yielding surface for the pickerstick to come in contact with.

The cushion *d* is held in position by means of the flexible metal strip *e*, the central portion of which extends across the upper side of the cushion and its ends are bent downwardly across the outer sides of the arms of the lug strap. The two extreme ends *e'* of this retaining strip are bent upwardly in the shape of a hook, each strip engaging the lower edges of its respective arm of the lug strap, and are interposed between the inner sides of said arms and the cushion. The cushion, being made of flexible material, is consequently indented by the said hooks, and thus prevented from dropping out.

With this plan of fastening, it will be seen that the cushion elasticity in the direction of the movement of the pickerstick. is held i nthe proper position iwthout interfering with its elasticity in the direction of the movement of the pickerstick.

When the cushion has to be replaced by a new one, the old one is then slipped out from between the hooks *e'*, the strip removed and a new cushion put in, and in turn secured to the strap by a new strip, these strips being so inexpensive, that they can be discarded after once used.

COTTON DESIGNING.

E. A. Posselt.

For the subject of this article, as will be seen by its heading, we have selected some of our most important weaves with reference to the manufacture of cotton goods, in fact as we might say, the standard weaves for these fabrics, weaves met with every day in the average mill, whether the same is running on plain or fancy work, weaves which form the backbone of textile designing, since most every weave as used in the construction of any cotton fabric can be brought back to these three systems of weaves explained in this article—plain, twill and satins—a feature which at once will indicate their importance to any cotton mill.

THE PLAIN WEAVE

as shown in connection with Diagram Fig. 1, is, as its name indicates to the reader, the most simple weave, requiring for its execution on the power loom two harnesses, of which one or the other alternately is up, the other one being down at this pick of the loom. In order to simplify this weave to the reader, Diagram Fig. 2 is given, and which shows us a portion of a fabric consisting of 12 warp threads and 12 picks interlaced with this plain weave, the warp threads being represented by means of black whereas the filling is shown up shaded, in order to give the reader a better understanding of a fabric constructed with this weave. The weave itself is of such a simple construction and the fabric structure executed to that point, that no further comment on it will be necessary, and for which reason we will at once take up our next system of weaves, viz:

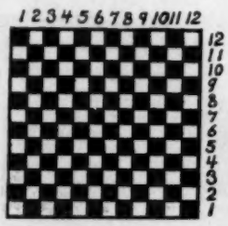


Fig. 1

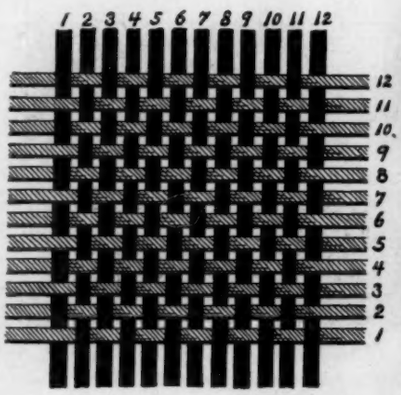


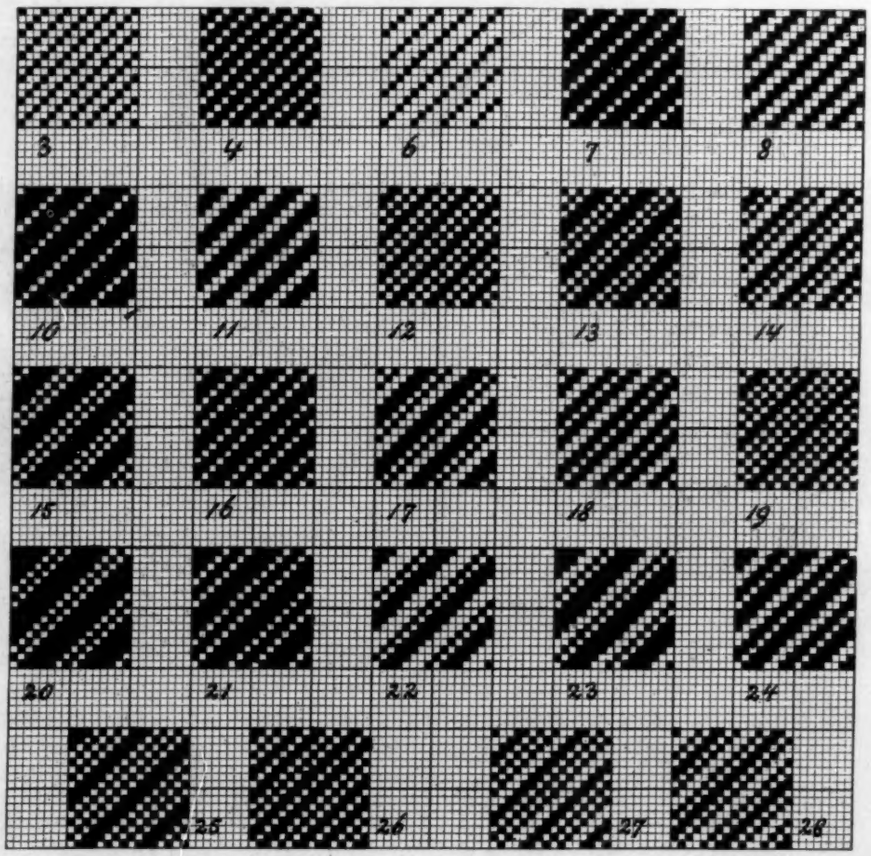
Fig. 2

TWILLS.

The lowest number of harnesses for which this system of weaves can be designed for is 3-harness, after which they can be made on any number of harnesses, as the case may require.

The rule for making out twill weaves is thus: After indicating on your point paper the interlacing of the first warp thread or the first pick, remember that every successive warp thread interlaces with its successive pick; for example, if the first warp thread interlaces with the first pick, the second warp thread interlaces with the second pick, the third warp thread with the third pick, and so on; again, for example, if the fifth warp thread should interlace with the second pick, the sixth warp thread in turn will interlace with the third pick, the seventh warp thread with the fourth pick, the eighth warp thread with the fifth pick and so on until the repeat of the complete weave is obtained.

Comparing cotton fabrics constructed with twills to those interlaced with the plain, we will notice readily that twill weaves permit of the introduction of more material, both with reference to warp as well as filling in the fabric structure, resulting in turn in a closer or heavier fabric than is possible to be made with the plain weave, for the fact that twills only interlace at intervals of two, three or more threads and consequently permit warp and filling to lay closer towards each other in the structure. The direction of the twill itself can be either arranged to run from left to right or vice versa, according to the nature and purpose of the fabric, although as a rule, the twill running from left to right in the fabric is the one mostly met with. As already previously referred to, the lowest number of harnesses for which twills are used is 3 and in connection with which we find two twills, viz: the $\frac{1}{2}$ and the $\frac{2}{1}$ 3-harness twill, possible to be made, either one requiring 3 harnesses and 3 picks for its execution on the loom, the first one quoted being what we technically call filling effect of the weave (see Fig. 3) whereas the latter one quoted is our warp effect (see Fig. 4). Both weaves are uneven sided twills, by what is understood, that if one of the weaves quoted is used for the face of the fabric, the other forms the back and vice versa.



it remains for the skill and ingenuity of the overseer to make it run as good as possible. If the roving is found very uneven, the overseer may introduce a little more twist in the yarn, which, however, may cause the ends to break down when a light place in the roving is reached, which, however, cannot be avoided, and under these circumstances is the best thing that can be done. If a lighter traveler can be used, it will put less strain on the yarn, and thus keep many ends from breaking, which otherwise would come down. In an instance of this character, it is true economy to reduce the speed of the spinning frame, since this means a partial relief of the strain on the thread, this being the object most sought after; however, the yarn spun from such stock, will in every case be of an inferior grade, and at best it is by no means perfect yarn.

In some instances, we may find two strands of different colored roving run together on the spinning frame, for the purpose of making an imitation of a fancy twist yarn, but this procedure does not give as satisfactory results as when the two threads are twisted together on a twister after being spun, since there will be found a decided absence of the distinct individuality of each color, which is so prominent in the ply yarn, when the colors are spun separate, and afterwards twisted together. If the colors spun together have a marked contrast, fairly good results may be obtained, otherwise the process is more or less a failure. If two pieces of cloth of similar design are placed side by side, one being made of yarn spun double, and the other of yarn doubled after being spun, the superiority of the latter will plainly be seen.

In order to produce good yarn and this of a uniform shade, the work must be started right at the mixing room, so as to lay there the proper foundation for a thorough mixing of the stock, since it is largely on account of the unevenness of the work at this initial process of cotton spinning that lays the foundation for a poor yarn as its final result. Strict attention must be continually paid to the management of the mixing room, since if this is not done the result will be that the work one day will be good and another bad.

The draft is another most important factor, and which on all the machines should be light, especially on the spinning frame, a short draft having a wonderful effect in brightening up the colors, while a long draft makes the thread appear dull and lifeless, even if it is of the same count.

When two rovings are spun together, they are drawn through the rolls side by side, each roving strand preserving its own individuality until it passes through the middle roller. Here the draft begins, and when then the fibres of one strand of roving become more or less intermingled with that of the other, hence the distinctness of each color is lost in that of the other. With a long draft, the fibres in each mass do not lie so closely or compactly together as they do in a shorter draft, which has a great effect in blending the two colors more or less into one, and as previously referred to, in order to get satisfactory results a short draft must be used. However, under the most favorable circumstances it cannot be hoped that the same effect can be produced, as if the yarn were doubled after being spun.

It is not advisable to run the spinning frames at too high a speed if the roving is being doubled, as the centrifugal action of the thread when at a rapid revolution throws out upon its surface a large amount of fibre which is but partially twisted in and gives the yarn a dull and hazy appearance, a feature which when the roving is uneven, or the draft greater than it should be, then the more prominently this will appear.

The New Orleans cotton trade allows only five ounces per bale for sampling. The Maritime Board at New Oryeans fixes the minimum density of a compressed cotton bale at 22 pounds per cubic foot.

AN IMPROVED LUG STRAP.

E. A. POSSELT.

The lug strap is one of the accessories to the loom, which on account of the action to its pickerstick will often wear out, and in this case has to be replaced with a new one, hence is a most important item with reference to the supply account of the mill, for which reason, any improvement in its construction to prolong its life, will be of the greatest interest to mill men.

The accompanying illustrations show us such an improvement to lug straps, and of which Fig. 1 shows us, in its perspective view, besides this lug strap, those portions of a loom to which the same more particularly refers, i. e., the pickerstick and the picker rod. Fig. 2 is a perspective view of the new lug strap, shown on a somewhat larger scale as compared to Fig. 1, so that the reader can grasp its advantage over styles found in general use.

THE OBJECT

aimed at in the construction of the new lug strap is to provide to the latter a detachable buffer or cushion, by means of which the pickerstick is prevented from coming in direct contact with the lug strap, the cushion receiving the force of the blow imparted to the pickerstick, and thus prolings the life of the lug strap as previously referred to.

With reference to letters of reference accompanying our illustrations, the same are selected correspondingly, and of which *a* shows us the pickerrod, *b* the pickerstick, *c* the lug strap and *c'* two slotted holes, one on each end of the sides of the strap, for connecting the latter to the pickerrod; *d* is the buffer or cushion and *e* a flexible sheet metal, provided for retaining the cushion in its proper position in the lug strap.

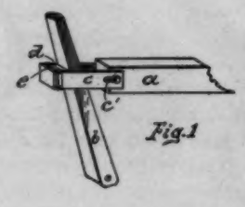


Fig. 1

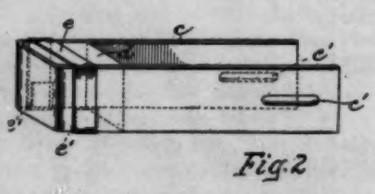


Fig. 2

DETAILS OF CONSTRUCTION.

The lug strap is made of one piece of sheet metal, the two ends of which *c'* are slotted in order to fasten to rod *a*, which connects with pick lever of the loom (not shown). The cushion or buffer *d*, and which is a block of felt or some other suitable cushioning material, is placed inside the arms *c* and against the neck of the strap, and consequently forms a yielding surface for the pickerstick to come in contact with.

The cushion *d* is held in position by means of the flexible metal strip *e*, the central portion of which extends across the upper side of the cushion and its ends are bent downwardly across the outer sides of the arms of the lug strap. The two extreme ends *e'* of this retaining strip are bent upwardly in the shape of a hook, each strip engaging the lower edges of its respective arm of the lug strap, and are interposed between the inner sides of said arms and the cushion. The cushion, being made of flexible material, is consequently indented by the said hooks, and thus prevented from dropping out.

With this plan of fastening, it will be seen that the cushion elasticity in the direction of the movement of the pickerstick. is held i nthe proper position iwthout interfering with its elasticity in the direction of the movement of the pickerstick.

When the cushion has to be replaced by a new one, the old one is then slipped out from between the hooks *e'*, the strip removed and a new cushion put in, and in turn secured to the strap by a new strip, these strips being so inexpensive, that they can be discarded after once used.

COTTON DESIGNING.

E. A. Posselt.

For the subject of this article, as will be seen by its heading, we have selected some of our most important weaves with reference to the manufacture of cotton goods, in fact as we might say, the standard weaves for these fabrics, weaves met with every day in the average mill, whether the same is running on plain or fancy work, weaves which form the backbone of textile designing, since most every weave as used in the construction of any cotton fabric can be brought back to these three systems of weaves explained in this article—plain, twill and satins—a feature which at once will indicate their importance to any cotton mill.

THE PLAIN WEAVE

as shown in connection with Diagram Fig. 1, is, as its name indicates to the reader, the most simple weave, requiring for its execution on the power loom two harnesses, of which one or the other alternately is up, the other one being down at this pick of the loom. In order to simplify this weave to the reader, Diagram Fig. 2 is given, and which shows us a portion of a fabric consisting of 12 warp threads and 12 picks interlaced with this plain weave, the warp threads being represented by means of black whereas the filling is shown up shaded, in order to give the reader a better understanding of a fabric constructed with this weave. The weave itself is of such a simple construction and the fabric structure executed to that point, that no further comment on it will be necessary, and for which reason we will at once take up our next system of weaves, viz:

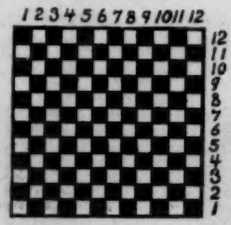


Fig. 1

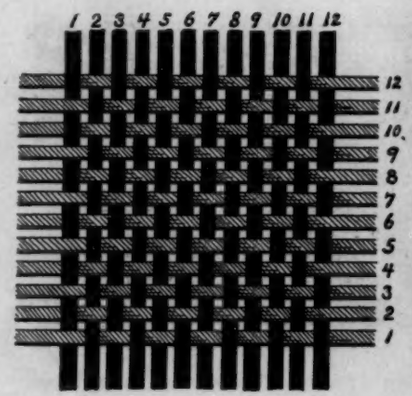


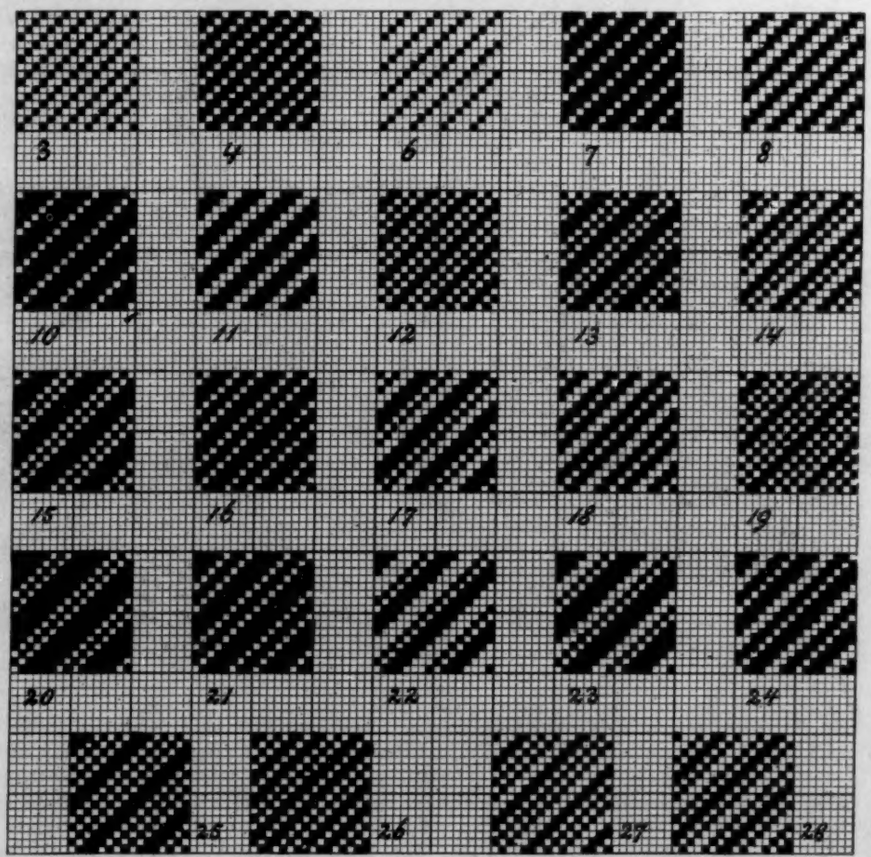
Fig. 2

TWILLS.

The lowest number of harnesses for which this system of weaves can be designed for is 3-harness, after which they can be made on any number of harnesses, as the case may require.

The rule for making out twill weaves is thus: After indicating on your point paper the interlacing of the first warp thread or the first pick, remember that every successive warp thread interlaces with its successive pick; for example, if the first warp thread interlaces with the first pick, the second warp thread interlaces with the second pick, the third warp thread with the third pick, and so on; again, for example, if the fifth warp thread should interlace with the second pick, the sixth warp thread in turn will interlace with the third pick, the seventh warp thread with the fourth pick, the eighth warp thread with the fifth pick and so on until the repeat of the complete weave is obtained.

Comparing cotton fabrics constructed with twills to those interlaced with the plain, we will notice readily that twill weaves permit of the introduction of more material, both with reference to warp as well as filling in the fabric structure, resulting in turn in a closer or heavier fabric than is possible to be made with the plain weave, for the fact that twills only interlace at intervals of two, three or more threads and consequently permit warp and filling to lay closer towards each other in the structure. The direction of the twill itself can be either arranged to run from left to right or vice versa, according to the nature and purpose of the fabric, although as a rule, the twill running from left to right in the fabric is the one mostly met with. As already previously referred to, the lowest number of harnesses for which twills are used is 3 and in connection with which we find two twills, viz: the $\frac{1}{2}$ and the $\frac{2}{1}$ 3-harness twill, possible to be made, either one requiring 3 harnesses and 3 picks for its execution on the loom, the first one quoted being what we technically call filling effect of the weave (see Fig. 3) whereas the latter one quoted is our warp effect (see Fig. 4). Both weaves are uneven sided twills, by what is understood, that if one of the weaves quoted is used for the face of the fabric, the other forms the back and vice versa.



In order to still further simplify matters for the reader with reference to the construction of twills, i. e., with reference to points thus far explained, Diagram Fig. 5 is given and which shows us the interlacing of 12 warp threads and 12 picks in connection with the $\frac{2}{1}$ 3-harness twill, warp effect, as given in weave Fig. 4, the warp threads in the diagram being again shown in full black and the filling shaded, in order to more clearly show the twill effect as produced in the fabric by means of this weave, and which repeats on 3x3.

The next number of harnesses with reference to repeat for twill weaves to be taken up is 4-harness, and in connection with which three different twills can be constructed, viz: the $\frac{1}{3}$ 4-harness twill, technically called its filling effect, (see Fig. 6) and which is an uneven sided twill, calling for its mate for the $\frac{3}{1}$ 4-harness twill, or warp effect, as we can also call it, and as shown in connection with Weave Fig. 7 in our collection of weaves accompanying this article. The third 4-harness twill possible to be constructed is shown in Diagram Fig. 8, it being our $\frac{2}{2}$ 4-harness twill technically known as our even sided 4-harness twill, by what we mean that provided we use the same counts of yarn and texture of fabric, both in connection with warp and filling, the same size twill will be formed on either side of the fabric, the only difference being that the twill is running on one side of the fabric in one direction and on the other side in the reverse direction. Diagram Fig. 9 shows us by means of 12 warp threads and 12 picks a fabric structure interlaced with this weave, the warp threads being again indicated in full black and the filling shaded, the Diagram being started to correspond with its Weave Fig. 8, considering the left hand lower corner in either case, as the point for starting.

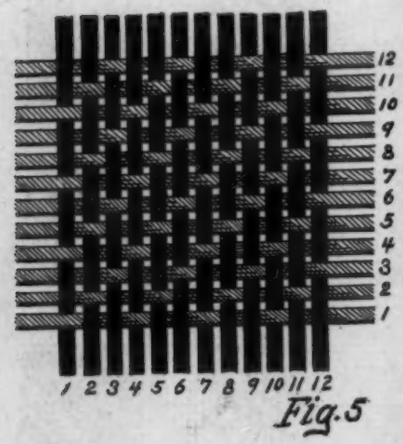
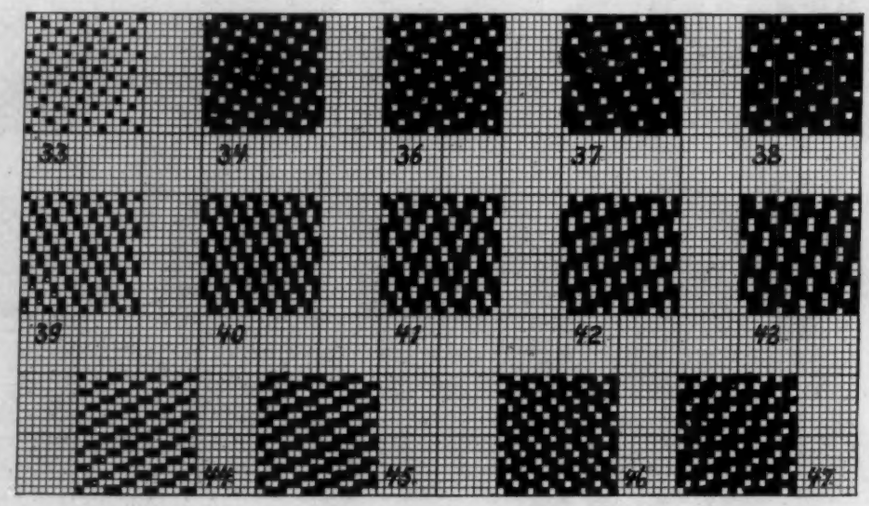


Fig. 5



Weaves Figs. 10, 11 and 12 of our collection of weaves accompanying this article, illustrate the different twills possible to be executed in connection with 5-harnesses, taking at the same time into consideration that only uneven sided twills can be constructed on 5-harness, and that consequently every weave given stands for two weaves possible, viz: the warp effect of each weave is shown, and its mate filling effect to each weave not shown, except we consider in either instance in connection with these three weaves □ for warp up and ■ for filling up. We have only shown the warp effects, although they at the same time illustrate the filling effects, for the fact that these weaves are used more frequently—warp up in connection with cotton goods.

Weave Fig. 10 is our $\frac{4}{1}$ 5-harness twill

Weave Fig. 11 our $\frac{3}{2}$ 5-harness twill and finally

Weave Fig. 12 our $\frac{1\ 2}{1\ 1}$ 5-harness twill,

considering in every instance quoted ■ for warp up, whereas for their filling effect, as previously referred to, consider in each instance □ for risers, i. e., warp up.

Having thus far given a complete review of all twills possible to be made up to 5-harness, and which cannot help but convey to the reader clearly the principle of their construction, we will from now on only quote the more complicated, i. e., fancy effect twills in connection with this article, or as we might say, quote only the twills producing double twill effects or more, in one repeat of the weave, omitting all the single twill effects. We have done this both for the purpose of using as little space as possible with reference to the article as well as the fact that these single twill effects will make little trouble to the manufacturer with reference to constructing such weaves.

In this way, we find quoted in connection with 6-harness twills, the following weaves:

Weave Fig. 13 is the $\frac{1\ 3}{1\ 1}$ 6-harness twill and

Weave Fig. 14 is the $\frac{2\ 1}{1\ 2}$ 6-harness twill.

Only the warp effect is shown in connection with Weave Fig. 13, considering in this instance ■ for risers; its mate filling effect, being in this instance given if quoting □ for warp up.

Weave Fig. 14 is what we term an even sided twill, the points of construction being somewhat similar to weave Fig. 8 previously quoted and for which reason no special explanation will be necessary in connection with this weave.

We now come to our fancy effect 7-harness regular twills

and of which five examples are quoted, covering in turn the construction of every fancy 7-harness regular twill possible to be designed, if taking into consideration that in all five examples we show warp effects by means of type; its mate filling effect being shown to the reader if considering for warp up.

Weave Fig. 15 shows us the $\frac{1\ 4}{1\ 1}$ 7-harness twill

Weave Fig. 16 the $\frac{2\ 3}{1\ 1}$ 7-harness twill

Weave Fig. 17 the $\frac{3\ 1}{1\ 2}$ 7-harness twill

Weave Fig. 18 the $\frac{2\ 2}{1\ 2}$ 7-harness twill and finally

Weave Fig. 19 the $\frac{1\ 1\ 2}{1\ 1\ 1}$ 7-harness twill.

The first four examples show us double twill line effects in each repeat of the respective weaves, whereas in connection with th last example, i. e., weave Fig. 19, three twill line effects are produced in one repeat of the weave, the latter twill resembling at the same time also what we might say a plain woven fabric having a fine twill line thrown over its face, being a weave very frequently met with in the construction of fancy cotton fabrics.

We now will take for our subject, explaining the collection of all the fancy regular twills possible to be designed in connection with 8-harnesses and in which instance we find nine different weaves possible to be designed, if taking into consideration that in connection with uneven sided twills only one weave is given, the same representing in connection with ■ for risers the warp effect, or the state in which the weave will be most frequently met with, whereas if considering □ for risers, the same weave given refers to its mate filling effect.

Of these nine weaves, Fig. 20 shows us the $\frac{1\ 5}{1\ 1}$ 8-harness twill,

Weave Fig. 21 the $\frac{2\ 4}{1\ 1}$ 8-harness twill

Weave Fig. 22 the $\frac{1\ 3}{1\ 3}$ 8-harness twill

Weave Fig. 23 the $\frac{1\ 4}{1\ 2}$ 8-harness twill

Weave Fig. 24 the $\frac{2\ 3}{1\ 2}$ 8-harness twill

Weave Fig. 25 the $\frac{1\ 1\ 3}{1\ 1\ 1}$ 8-harness twill

Weave Fig. 26 the $\frac{2\ 1\ 2}{1\ 1\ 1}$ 8-harness twill

Weave Fig. 27 the $\frac{1\ 2\ 1}{1\ 1\ 2}$ 8-harness twill and finally

Weave Fig. 28 the $\frac{2\ 1\ 1}{1\ 1\ 2}$ 8-harness twill.

Of these nine examples of 8-harness twills, weaves Figs. 20, 21, 23, 24, 25 and 26 are what we can term uneven sided twills, the other three weaves being even sided twills.

Having thus far given a thorough explanation of the construction of all these plain and fancy twill weaves up to and including 8-harnesses possible to be constructed, it will be readily understood that by means of it, the reader has at the same time been instructed to construct for himself any plain or fancy twill he ever will come in contact with, or ever be required to be constructed by him.

We will now take up the difference in interlacing of weaves, and for which reason Diagrams 29 to 31 have been constructed.

Diagram 30 shows us a plain weave and Diagram 29 the corresponding section of a fabric interlaced with this weave, both diagrams calling for 8 warp threads and 8 picks, Diagram Fig.

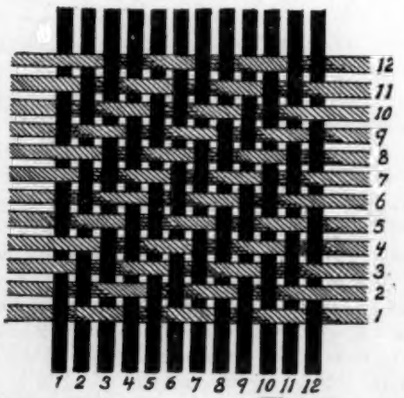
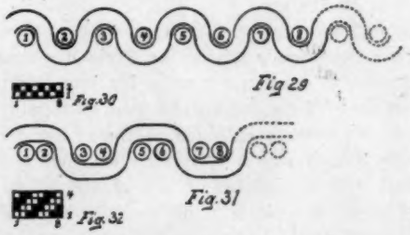


Fig. 9

29 being the section of pick 1, shown in connection with weave Fig. 30. This will show us that in connection with 8 warp threads of said plain weave, we have to contend with + the diameters of 8 picks at the same time or in other words there are 16 diameters to be considered to the 8 warp threads.

To show the looser structure of a twill weave, Diagram 31 is given, the same being pick No. 1 of the 4-harness twill given in connection with Fig. 32, and calling again for 8 warp threads executed. In this instance, it will be noticed that in connection with said 8 warp threads only 4 diameters of the filling are taken up and which consequently will give us 8+4=12 diameters of threads used in connection with these 8 warp threads, vice



versa, the 16 diameters necessary to be used in connection with similar 8 warp threads but interlaced with the plain weave, a feature which will readily show the reader that in connection with a twill, he can use more warp threads and more picks per inch, i. e., produce a heavier cloth than is possible with the plain weave, it being a feature previously referred to already in the beginning or the article, the present two diagrams of sections of the fabric only being given to more thoroughly explain this subject. As will be readily understood, in connection with both Diagrams Figs. 29 and 31 the actual position of warp and filling in connection with these sections has been somewhat exaggerated, the threads in the fabric structure actually resting more compressed as well as more out of place than given in our illustrations; by what is meant, each warp thread will influence

the position of its joining filling strand and vice versa, the filling pushing the warp threads somewhat out of their straight line. This, however, will not influence the advantages of the diagrams to the student, in fact it will only simplify matters to him, whereas is we had drawn warp and filling out of shape as they are positioned in the fabric, it might have become harder for him to understand the diagram, since he would have wondered how threads are pushed out of the way through the weave, whereas to his mind they are resting properly side by side as shown in the diagrams.

Having thus far given a thorough explanation of the construction of our twill weaves, we will next take up the construction of our

SATIN WEAVES,

and for which reason the accompanying plate of weaves as well as diagram of the 5-leaf satin in detail is given.

Fabrics constructed with satin weaves are without the prominent lines characteristic to our twills, by what is meant that satin weaves give to the fabric always a more or less smooth face. The same as with our twills, two different effect satins can be designed, viz: warp effect and filling effect, both effects being extensively used in connection with many cotton fabrics, the combination of both effects being also made use of in connection with figured designing. The main object aimed at in the construction of satin weaves is to arrange the interlacing of warp and filling as much as possible distributed and yet at the same time as regular as possible distributed. This point is the reason why the interlacing of warp and filling in a fabric interlaced with a satin weave is not as prominent to the eye as that in connection with twill weaves previously explained.

The lowest number for constructing satins is 5-harness, although some designers may consider the 4-harness broken twill as a satin weave, which however, is not the case, and which weave will be dealt with in connection with another article to be prepared later on for this important division of weaves (broken twills).

After 5-harness, regular satins can be constructed for any number of harnesses with the exception of 6, in the latter instance there being no regular satin possible to be designed, we using in its place then what we technically term the irregular 6-harness satin, also frequently called the "crow-foot" twill and which is a most important weave for the cotton manufacturer, being a weave that is very extensively used in connection with figured stripes, checks, etc.

We now will take the rule for constructing our satin weaves and which is a most simple affair, viz: Divide the number of harnesses you want to construct a satin for into two prime numbers, adding one of these numbers in turn continually to 1, until the repeat of the weave is obtained, taking at the same time into consideration that in the construction of such a satin weave we only deal with one repeat of it and for which reason any number whenever coming into the second repeat of the weave has to be transferred to its proper number in the first repeat. By this we mean, for example, if in connection with a 8-harness satin, by means of counting if we should call for number 11, this then means 11—8 (repeat of weave)=3 for our count-off. count-off.

The example will be readily explained by means of showing the construction of our 5-leaf satin.

5=2 3, using 2 as a counter we find, 1+2=3+2=5+2=(7) =2+2=4+2=(6)=1, giving us in turn the points for interlacing warp and filling in connection with a 5-leaf satin can be formed by means counting off with 2 as follows: 1A3A5A2A4 and which means that either

The first pick interlaces with the first warp thread,
The second pick interlaces with the third warp thread,
The third pick interlaces with the fifth warp thread,
The fourth pick interlaces with the second warp thread and
The fifth pick interlaces with fourth warp thread;

Or that if taking the warp threads in proper rotation and skipping the filling,

The first warp thread interlaces with the first pick,
The second warp thread with the third pick,
The third warp thread wit the fifth pick,
The fourth warp thread with the second pick and finally
The fifth warp thread interlaces with the fourth pick.

The question might now be asked, which is the best way to construct the satin, i. e., whether to use the warp in rotation and skip the filling, or vice versa use the filling in rotation and skip the warp; or why have we used 2 as a counter and why not 3. In answer to this question we have to state that this matter is of litle importance to the designer, since either one of the four procedures quoted will produce the same identical satin, the only difference being that in one instance the slight

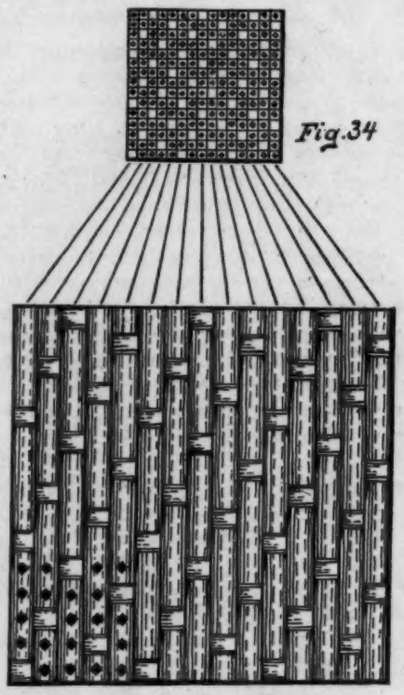


Fig. 34

Fig. 35

twill of the satin, and which is present, will run in one direction and in connection with the other procedure in the other direction, two procedures of those four quoted always producing the same result, and for which reason only two different positions of the satin could result, a feature which is of little consequence, any more than left hand or right hand twill. This, however, only refers to the construction of the weave, whereas when we speak its application to a woven fabric, we then must be careful which kind of twill or which kind of satin we are to use; which one to use depending entirely upon the character of the fabric under consideration, whether we want a smooth face or whether we want a soft, open or rough face.

Weave Fig. 33 shows us the 5-leaf satin thus constructed, it referring to what we term our filling effect weave, Fig. 34 showing us its respective warp effect.

In order to show the general interlacing of the satin weave, fabric structure Fig. 35 is given. Weave Fig. 34 shown above on this plate, is the same 5-leaf satin warp effect previously referred to in connection with our plate of weaves. In order to simplify

matters still more for the reader, we have indicated in the left hand lower corner of the fabric structure Fig. 35, the corresponding risers of the weave given about, by means of , and which cannot help but explain itself as well as the general construction of the weave and fabric at once to the reader, for which reason no further reference in the affair is necessary.

Weave Fig. 36 shows us the 6-harness irregular satin warp effect, or the crowfoot twill as occasionally called, and a most important weave to the cotton designer. The draft for this weave is thus: 1x3x5x2x6x4, or in other words draft for 3 picks from left to right, using every other warp thread, next find center of float and draft for 3 picks from right to left, using again every other warp thread only.

Weave Fig. 37 shows us our 7-leaf satin warp effect and Weave Fig. 38 our 8-leaf satin warp effect. In either instance, in connection with weaves Fig. 36, 37 and 38 the taken for risers means, as quoted in the article, warp effect. If referring to a filling effect simply consider for risers. Having thus given a thorough explanation as well as illustration of the different satins possible to be made up to and including the 8-leaf, and which comprises the ones mostly met with, in fact the only ones met with in connection with in the designing of cotton fabrics, it will be easy for the student to construct any satin for a higher number of harnesses, if so required.

We now come to the construction of satin weaves technically known as double satins, the construction of which is explained in connection with weaves Figs. 39 to and including 47.

Weave Fig. 39 shows the 5-leaf double satin, filling effect, being produced by means of adding an additional spot on top of each spot of interlacing of the common 5-leaf satin. To simplify matters we have shown the original 5-leaf satin by means of in the left hand lower repeat of the weave, this weave is also sometimes called filling effect 5-harness corkscrew.

Weave Fig. 40 shows us the warp effects of this 5-harness double satin.

Weave Fig. 41 shows us the 6-harness double satin, warp effect,

Weave Fig. 42 shows us the 7-harness double satin, warp effect, and

Weave Fig. 43 shows us the 8-harness double satin, warp effect.

In every instance in connection with these five examples quoted, we added the additional spot as applied to the regular satin on top of it, which however, is not always done, since in some instances, provided we want well broken up effects as a result in the fabric structure, this spot is put in an oblique position to the foundation satin, a feature readily explained in connection with weaves Figs. 44 to 47 and of which Weave Fig. 44 is the 5-leaf oblique double satin, filling effect, its construction being again clearly shown by means of in the left hand lower corner of the weave. Weave Fig. 45 is its mate warp effect. Weave Fig. 46 shows us the 7-harness oblique double satin and weave Fig. 47 the 8-harness oblique double satin. In both of the latter instances, i. e., weaves Figs. 46 and 47, we show the warp effect by means of type. Provided for one reason or the other, the filling effect of these two weaves should be required by the manufacturer, simply consider for risers. In the same way as with the regular satins, we have shown the double satin up to and including 8-harness, covering again the most important weaves of this division met with, and besides any person understanding the construction of either regular or double satins up to and including 8-harness, cannot help but master the construction of any satin weave for any number of harnesses quoted for.

A BUILDER MOTION FOR MAGAZINE LOOMS.

In weaving cotton fabrics on magazine looms, it is very important that a filling pick is not missed when the empty bobbin is automatically replaced by the action of the magazine by a full one. To eliminate this trouble, this class of looms are equipped with a so-called feeler motion, the object of which is to put in operation the bobbin changing device before the yarn on the bobbin in the loom shuttle has entirely run out.

For this reason, it is necessary to leave a certain amount of filling on the bobbin, in order to operate the characteristic feeler motion of the loom. The yarn thus left on the bobbin is waste, or a loss to the mill, for which reason, any improvement of the builder motion of a spinning frame, by means of which this amount of yarn required to operate the feeler motion of the magazine can be lessened, and which forms the object of the new device hereafter illustrated and explained, will be of the greatest of interest to cotton manufacturers.

In this improved builder, the object aimed at is to provide means whereby a bunch of yarn, containing several yards of thread, may be wound on the bobbin at the beginning of the winding operation, the bunch being arranged near the base of the bobbin and at a point beyond the plan of movement of the feeler finger, so that two or more picks still can be made by the loom, after the feeler assumes its operating position.

The principle of this builder motion is, that it is so arranged

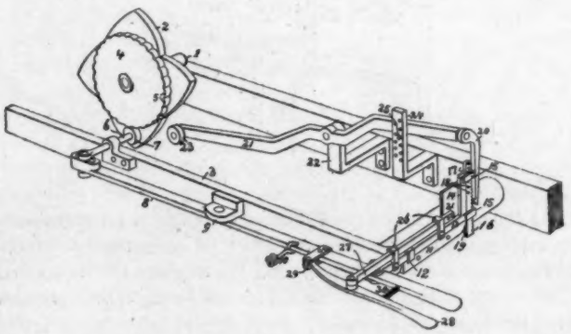


Fig. 1.

and constructed that the bunch may be readily formed at the proper place on the bobbin at the beginning of the winding operation, and when the bunch has attained a sufficient size to automatically adjust the traverse motion of the builder, to permit of the ordinary winding.

With this builder motion, the ring rail is operated in the usual manner, by the lifting rods, which in turn receive their motion through the usual chain.

In order to show the reader how the device operates, reference will be made to the two accompanying illustrations, of which Fig. 1 is a detail view of the contrivance, showing the construction and mounting of the builder arm, and the means for automatically shifting the builder arm roller from engagement with the builder cam. Fig. 2 shows in detail the mechanism for taking up the slack and traverse chain, in order to adjust the ring rail to its lowest position when forming the characteristic bunch, previously referred to.

Fastened to the frame of the machine is cam shaft 1, supporting the builder cam 2, which is similar to the ones in the use of the ordinary builder motion for filling, said cam serving to depress the builder arm 3 for the purpose of operating the builder mechanism. Fastened to this builder cam 2 is a buncher cam 4, which is in the form of a disk, the periphery of which is divided into a plurality of cams 5, each of which is intended to impart a slight vertical movement to the builder arm 3, for the purpose of moving the ring rail during the winding of the bunch, the

lift of each cam being at the same time very slight, so as not to form too large a bunch.

The bunch thus formed of crossed threads presents a hard surface on which the regular winding may take place without any danger of the yarn being caught and broken by the yarn forming the bunch, which is often the case when the bunch is formed of uncrossed threads as would be the case provided the ring rail was stationary while the bunch is wound.

The builder arm 3 is provided with a traversely disposed opening, carrying a stud 6, on the outer end of which is the antifriction roller 7, which is operated on by the buncher cam 4, while the bunch is being made, and is then automatically shifted to the regular building cam 2.

It will be noted that the deepest indentations between the proections of the builder can are in alignment with the indentations on the buncher cam 4, so that the roller can be readily shifted from one cam to the other. The stud 6 is fastened to the end of a lever 8, which is pivoted to a bracket on the builder arm 9. A spring 10 has a tendency to move the lever 8 in such a manner as to force the roller 7 from the buncher cam to the builder cam; however, this movement in turn is resisted by a locking mechanism, which holds the lever 8 until the bunch has been wound.

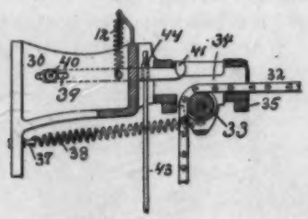


Fig. 2.

At the outer end of the builder arm is the usual arrangement for taking up the traverse chain in forming the bobbin (not shown) but since this taking up motion requires for its operation a full stroke of the builder arm, it is not brought into play until after the bunch is formed.

Fastened to the collar or hub of the builder arm is a locking bar 11, to which are fastened one or more guides 12, supporting the movable bar 13, the outer end of which is connected by a pivot to the lever 8. The inner end of said bar 13 has an outwardly extending arm 14, the inner face of which has yoke-like guides 15, in which a vertically movable rack 16 is mounted. The position of this rack, at the starting of the operation, is determined by a pin 17, which may be placed in any one of the openings 18 in said rack, the pin resting on top of the upper guide 15. The back of the rack bar 16 is provided with small teeth 19 which engage with the pointed end of the bar 11, and as the rack bar is moved upward, step by step, the teeth 19 enter and the rack 16 is held in position by the point of the bar 11.

The rack 16 is operated by a pawl 20 hung to the end of lever 21, as pivoted in bracket 22, and carries at its other end a roller 23, for engagement with builder cam 2.

The stroke of the pawl 20 is controlled by means of a perfroated bracket 24, and a pin 25, which is placed into that hole necessary to allow the proper stroke. The pawl carrying end of the lever 21 being heavier than the opposite end, will naturally move downward. The adjustment of pin 25 determines the rapidity with which the rack bar 16 is moved to its released position, and when in turn by thus adjusting the length of time which the roller 7 is allowed in contact with the buncher cam 4, the quantity of yarn wound to form the bunch, is adjusted. Further adjustment may also be made by changing the position of the pin 17, so that the rack bar 16 is raised to a great or less distance before it is released.

Fastened to the bar 13 are the guides 26, provided for the reception of the slidable bar 27, the outer end of which is pivoted to a hand operated lever 28, pivoted to bracket 29, secured to lever 8. This hand lever is forced outward by a compression spring 30.

At the end of the bar 27 is a plate 31, that is arranged to engage the pawl 20 to prevent it from remaining in contact with the teeth of the rack bar while the parts are being adjusted for making a new bunch. In operation, the pawl 20 is reciprocated until the end of the rack bar is above the bar 11, and when then the spring 10 acts to pull out the bars 13 and 27, together with the rack bar, the latter moving away from the pawl while the opposite end of the lever 8 moves in the direction of the builder arm, and in turn carries the stem 6 over, until the roller 7 comes into contact with the builder cam.

In order to readjust the parts, it is only necessary to grasp the handled lever 28 and the end of the lever 8 and when by pressing them together, the bar 27 is forced inward until the plate 31 holds the engaging end of the pawl out of contact with the teeth of the rack bar, so that the rack bar when pushed beyond the pointed end of the bar 11 will fall to its lowest position, in readiness for another operation.

In order that the bunch is wound in proper position on the bobbin, it is necessary that the ring rail be lowered to its proper position at the beginning of the operation. In explaining this, reference is made to Fig. 2, which shows the traverse chain 32 led over a roller 33, that is carried by a support 34, mounted in guides 35, which are formed at the outer end of the bracket 36, the latter being fastened to the inner side of the frame end of the machine. This slidable support 34 is connected to a fixed eye 37 by the tension spring 38, which in its normal condition pulls the support 34 towards it, in turn moving the traverse chain and rocker arms and thus depressing the lifter rods. However, this movement is resisted by the weights of the lifter rods, the spring 38 not being strong enough to overcome this resistance, so that the traverse chain is held under stress and moved as usual in one direction by the builder arm, and in the other direction by the counter weights of the lifter rods.

The bracket 36, is provided with a slot 39, in which the pin 40 is locked. Mounted on the pivot pin is a hook 41, which is held upwards by a spring 42, the purpose of the hook being to engage with the support 34, and lock it as shown in our illustration, provided the support is moved to the left. To accomplish this, the rocker frame of the first lifter rod is fitted with a pedal (not shown) which can be depressed by the operator, and thus the counter weight removed from the traverse chain, and when then the spring 38 draws the support 34 to the left, and then the hook 41 engages and locks said support 34 in its adjusted position, after which the hook may be removed by the operator, and the counter weight again put into action.

The adjustment of the roller 33 takes up part of the traverse chain 32 and lowers the ring rail to the proper point for forming the bunch, and as the buncher cams 5 moves the roller 7, the ring rail will be given a slight traverse motion during the formation of the bunch.

The hook 41 is fitted with a rod 43, the lower end of which is connected to the builder arm, the upper end carrying nut 44, which engages with the hook when the roller 7 has been transferred to a position in alignment with the builder cam.

The hook 41 is fitted with a rod 43, the lower end of which is connected to the builder arm, the upper end carrying nut 44, which engages with the hook when the roller 7 has been transferred to a position in alignment with the builder cam.

At the beginning of each operation, the pedal 42 is depressed to allow the support 34 to move to the left, and when the support is locked by the hook 41, the downward pressure of the pedal is

relieved and the other parts adjusted with roller 7 in alignment with the buncher cam and when the operation proceeds. The builder arm is raised and lowered very slightly, which in turn gives the ring rail a short traverse, and winds a crossed bunch. In forming the bunch, each time the builder arm is moved down, the builder cam will come in contact with the roller 23, and rock the lever 21. By this motion in connection with pawl 20, the rack bar is raised one or more teeth. When the lower end of the pull the bar 13 and the rack bar outward, the lever 8 being then moved to change the roller 7 from the buncher cam 4 on to the builder cam 5, after which the traverse begins the usual winding.

Since the builder arm is depressed by the builder cam to a much greater extent than by the buncher cam, the rod 43 is held down until the nut 44 engages the hook 41 and pulls it out of engagement with the arm 34, and when the counter weights of the lifter rods have a tendency to pull the traverse chain to the right, in turn moving support 34 outward and against the stress of the spring 38, and when the parts will assume their normal position and continue the regular winding of the bobbin in the usual way.

POWER PLANT OF THE OLYMPIA COTTON MILLS.

This plant is located just outside of the southern limits of the city of Columbia, S. C., near the banks of the Congaree river, at the head of navigation of this stream, and is also reached by three systems of railroads, viz., the Southern, Seaboard and Atlantic Coast Line.

The main building is 151 feet wide, 553 feet long with an average height, floor to floor, of 18 feet. The entire building is built of brick in what is known as the pier construction, the piers carrying the weight of floors and machinery, the window spacing being filled in with thin walls. On the front are two handsome towers with terra cotta trimmings and slate roofs. In these towers are placed the stairs, water tanks for sprinkler fire protection, clock and bell. Opposite these towers on the rear of the building are two plain towers containing elevators, toilet rooms, two fire-proof walls which extend the full height of these towers, giving a run-way for pipes and insuring ample ventilation.

The power plant building is located 20 feet back of the main mill and connected with it by a covered passage-way. The power house contains the engines and boilers, generators, switchboard and other electrical apparatus, machine and wood shop, heaters, ventilating fans and all the necessary pumps, etc. The outward appearance is very handsome, having a parapeted roof about level with the third floor of the main mill, arched windows in the upper part of the engine and boiler rooms, and other details of brick work of such design as to give strength and solidity combined with some architectural adornment.

General dimensions of the building are 137 feet long by 120 feet wide, except at the boiler room, where it is 140 feet long, and in addition there is an induced draft room 39 by 37 feet adjoining the rear of the boiler room. Through the roof of this room extends the steel smoke stack of a sufficient height to carry any smoke above the mill windows and roof. The roof of the machine shop is much lower than the engine room adjoining it. In the basement of the machine shop are located the heating and ventilating fans, and under the engine and boiler rooms are also basements.

Fireproof construction is used throughout the entire power plant; the wall being of brick, the floors of brick arches and concrete carried on steel beams, and the roof trusses also of steel, no wood being used except in connection with the doors and windows and roof planking. In the engine room is a marble wainscoting 6 feet high extending around the room, while the floor is of Tenazzo mosaic. The ceiling is of pressed steel, and the general effect is such as to give the idea of great power and is arranged in the best manner for efficient and economical development combined with some ornamentation, so that the room is relieved of its plainness and tends to promote a spirit of pride among the operative force which tends to increase efficiency. On account of the electrical machinery, which would be injured by water, there are no sprinkler pipes in the power plant, the fire-proof construction rendering them unnecessary.

In brief, this is a steam-electric power plant, consisting of three vertical cross compound engines direct connected to 1,300 kilowatt alternating current generators. Steam is supplied by twelve vertical water tube boilers, arranged in batteries of six each. To consider more in detail the arrangement of the plant, it will be necessary to follow through the several stages from the coal-pile to the motors. Starting from the coal trestle alongside the boiler room, coal cars are run onto the trestle and dump into pockets, which are so arranged that the charging cars run from the boiler room are loaded without shoveling. Open-sided cars are used and the track in front of the boilers is double so that empty cars can readily return to the coal pockets for filling. There is a small scale house near the door of the boiler room through which the cars pass so that they can not enter the boiler room without being weighed.

In the boiler house are twelve 250-horsepower Cahall vertical water tube boilers, built for a working pressure of 165 pounds. These are set in two batteries and connect with three Y-shaped sheet iron flues with vertical brick smoke flues forming pilasters in the rear wall of the boiler house, so that the flue gases pass out of the up-take of the boilers and down into the main smoke flue. The latter is a brick arched tunnel directly underneath the boilers and running the entire length of the boiler house. The basement underneath the boiler room is 10 feet high, which allows the construction of this smoke tunnel and also gives access for removing the ashes.

Each boiler contains 2,533 square feet of heating and 48 square feet of grate surface. Pocohontas coal is used and underneath each furnace is a hopper-shaped ashpit connected with a chute located so as to discharge into ash cars that run the length of the basement. The cars are of the side dumping type and have a capacity of 27 cubic feet.

At the center of the boiler house a branch from the main smoke tunnel runs back under the rear wall and into the induced draft room, where it connects with the inlet to two Sturtevant steel plate exhaust fans which produce the necessary draft. Each of these fans have wheels 14 feet by 7 feet. Each fan is driven by a 11½ by 16-inch horizontal Sturtevant engine running at a low speed to give the greatest economy in the moving of the hot flue gases. The draft is regulated by controlling the speed of the fan engines through a damper regulator connected with a balance valve in the steam pipe. In addition to this each engine has its own throttle valve for hand regulation.

The fans discharge upward and both are connected to one stack which carries the gases and smoke high enough to prevent it from blowing into the mill windows. There is a jacket around the stack for about two-thirds of its height. Under the ashpits and parallel to the main smoke tunnel, is another tunnel which has a connection with the induced draft room, so that the air entering it passes through the jacket surrounding the stack and becomes heated by contact with the fans and stack. Ducts in the brickwork between the ashpits supply this heated air to the furnaces; this supply, however, being entirely independent and separate from the ordinary air supply.

Returning again to the boiler room, we find a system of platforms about the boilers giving access to all the cleaning doors, also to the different steam valves, as the greater part of the piping is quite a distance from the floor. The main steam piping is extra heavy, and in every case when possible, long bends and gate valves are used, so as to offer as little obstruction to the flow of steam as possible.

Each boiler has an 8-inch steam connection, and the size of the pipe increases as different connections are made up to the main steam drum, which is of 16-inch pipe and about half the length of the boiler room. In the 12-inch pipe from each battery of boilers to this 16-inch main is a separator, and the valves are placed at all points where necessary, to allow the shutting off of any boiler or group of boilers, as well as to allow some of the boilers to run at lower pressure, if desired, to furnish steam to the heating system, etc. Every precaution is taken to prevent the loss of heat, the pipes being covered with fire felt covering and all drips returned to the boilers.

Adjoining the boiler room and separated from it by a brick wall, is the engine room, the floor of which is some 4 feet higher than the boiler room floor. There are three McIntosh & Seymour vertical cross compound condensing engines each of a normal rating of 1,600 horsepower, with cylinders 23 and 48 inches in diameter and a stroke of 42 inches. The cylinders are steam jacketed and a reheating receiver is placed between them. These engines are designed for multiple running, having a special speed-changing device by which the speed can be changed from the switchboard. This device consists of a small electric motor revolving with the governor and acting on the governor springs through a weight which it moves in or out from the shaft. This motor is connected to a small double throw switch located on the switchboard near the synchronizing device. By means of this device the speed can be adjusted very accurately allowing the generator to be connected in multiple with the least disturbance to the distributing system.

Each engine is equipped with a complete set of gauges, counter and indicators, and constant records are taken. Provision is also made for observing temperatures and pressures at all points throughout the plant where such information is required to make accurate and somplete tests.

The condensing apparatus is located in the basement back of the engines and is all exposed to view from the engine room floor. It consists of three 14 and 38 by 21 inch vertical beam air pumps and jet condensers, which are of such size and so connected that any one may be shut down without interfering with the working of the engines. The main exhaust pipes from the engines run through the wall into the boiler room and have free exhausts, with necessary automatic relief valves extending upward through the roof.

Back of the engines and on the engine room floor are four 6½x8-inch triplex pumps direct geared to electric motors. These are used for boiler feed purposes, and also for supplying water for the air moistening system throughout the mill. In addition to these pumps there are two 8 and 6x12-inch vertical duplex admiralty pattern steam pumps in the boiler room located in front of the boilers on the wall and connected into the same system of piping.

Feed water is heated by two 1,500-horsepower heaters located in the basement between the air pumps and condensers, with the piping arranged in a duplex system. The piping is carried along inside the main smoke flue, so that the heat from the flue gases may add to the temperature of the feed water. The feed water is measured by two 4-inch hot water meters in the boiler room basement, with spindles extending through the floor, so that the counters may be read from the boiler room.

The electric generators are direct connected to the engines and each rated at 1,300 kilowatts. These machines are 40 cycles, 3 phase, 600 volts, revolving field type and have 36 poles running at a speed of 133 revolutions per minute. There are two exciter sets, steam and motor driven. The steam exciter is a General Electric marine type vertical engine direct connected to a 75-kilowatt 125-volt direct current generator and is used for starting the plant and in case of any accident to the motor exciter nominally in use. This machine is also used at night to supply any lights needed for making repairs when the main generators are not in operation. The motor exciter set is a 75-kilowatt generator driven by an induction motor; in fact, a motor and generator on a common base.

The switchboard is located on the engine room floor directly in front of the main generator sets. It is 57 feet long and is divided into 21 panels, made of polished blue Vermont marble with sub-bases, all mounted on angle irons, with the mosaic of the floor formed around the base of the board in such a manner that any water used in scrubbing the floor will not run under orface the marble slabs.

Beginning at the left of the board and in the order named the different panels are as follows: 3,300-volt output panel controlling current for the Columbia Electric Street Railway, 3,300-volt current to the Granby Cotton mills, on each of which is an ammeter, integrating wattmeter, and automatic circuit breaker. Next is the outside totalizing panel containing an ammeter, voltmeter, automatic switch, and synchronizing device. Then there are placed two transformer panels with ammeters, quick-break switches and oil circuit breakers. Two exciter panels contain voltmeter and ammeter, exciter switch, rheostat and oil switch. Each of the generator panels contains a voltmeter, integrating wattmeter, one ammeter for the field and one for the main current; a synchronizing device, carbon-break field switch and nonautomatic oil switch. Next is the totalizing output panel for the mills which contains a frequency indicator, ammeter and integrating wattmeter, while adjoining it are eight three-circuit motor panels, each containing three indicating ammeters and three oil switches. At the right hand end of the board is a two-circuit lighting panel with two ammeters, integrating wattmeter and two oil switches. All switches for the three-phase current are of the triple pole single throw, oil emersed type. As each motor circuit is provided with a wattmeter, it is at once apparent if there is any abnormal consumption of current due to an increase of friction brought about by any derangement of the producing machinery.

In the engine room basement directly under the switchboard are twelve air blast transformers used in connection with the power distributed for outside uses. They have a capacity of 265 kilowatts each, and raise the voltage of 600 delivered by the generators to 3,300 for outside lines. The arrangement of the transformers are in two groups of six each, delta connected, and mounted over an air duct, having small blowers direct connected to induction motors located at each end of duct. The high tension wires are let out of the top of the transformers and pass up through the machine shop behind a fire-proof partition and out through a monitor on the roof adjoining the engine room wall. The power used in the main mill is distributed by wires running through a wire tunnel parallel to the heating and ventilating tunnel.

A 20-ton three-motor electric traveling crane spans the entire width, and runs the entire length of the engine room, and was used in erecting the engines, condensers, in fact, everything in the engine room, and is now used in making any repairs or changes that may become necessary.

The hydrant and fire service piping is fed by a 1,000 gallon steam underwriters' pump located in the engine room basement and just above the cold water tunnel from which the other pumps and condensers receive their supply. The pressure is constantly kept on the system and the pump controlled by a governor.

All the electric wiring in power plant from generators, exciters and pumps to the switchboard is of rubber covered stranded wire designed for a 25 per cent. overload without increasing the voltage drop.

Current for the motors is distributel at 575 volts, three-phase

without transforming from the generators through the switchboard as previously described. The wire used is "slow burning" insulation run on wood supports with porcelain cleats to a tunnel which extends nearly the full length of the mill. Ending in this tunnel are channels in the side walls of the mill extending to the different floors on which motors are located. The horizontal wires in the tunnel are supported overhead, anchored at one end and fitted with turn-buckles enabling all slack to be readily taken up.

Wires branching from the main tunnel are placed in the channels as described, and are brought out on the ceiling of the next floor below on which the motors are located. They are then carried along this ceiling on single wire porcelain cleats, spaced 4 feet apart, wires 4 inches apart, and pass through the floor alongside of the column nearest to the motor, thence up the column in a flexible conduit fastened with iron pipe clips, being well protected from mechanical injury, to a quick-break switch located on the column. The switch is enclosed in a fire-proof box, with glass cover, with the operating handle on the outside of the box. From the box the wires are carried up column in the flexible conduit to the motor located in an inverted position on the ceiling. On all the motor distribution the wiring loss is 1½ per cent of the delivered power at full load from the switchboard to the motor.

For lighting, 350 6½-ampere enclosed arc lamps, and 2,500 16-candlepower incandescent lamps are employed. For these, two 3-phase 575-volt circuits are required, each run in the same manner from the switchboard as the motor wires just described, but instead of rising in channels from the wire tunnel they are carried to the two rear towers and rise in the pipe wells. Here the 3-phase current is "split." A single phase oil cooled transformer, 575 primary to 230-115 secondary, is used for each half of each floor. The primary wires are connected single phase through a quick-break switch and enclosed fuses all located in the towers. From the transformers 3-wire 115-230-volt feeders are carried on the ceiling in the same careful manner as the motor wires to the center of distribution for this section, where it feeds two sets of mains through enclosed fuses. The mains are beams for longitudinal wires and also overcomes the objection to run in channels 2x10 inches, located near the walls on both sides of the room, and over the floor beams.

These channels were formed by leaving out one of the heavy floor planks on each side and allowing the finished floor to extend over. This construction obviates all boring and insulating of wires being strung on the underside from beam to beam. All the feeders and mains are "slow burning" insulation put up with porcelain cleats, and all wire above No. 8 B. & S. gage are fitted with insulated turn buckles by which they are put up taut and kept so. The branch lines are all rubber insulation and incased in neat wood molding painted inside and out and provided with cap screwed in place. The arc lamps are supported from steel supporting hooks with spiral springs. The safety fuses throughout are of plug and enclosed type; no open or link type being used.

In addition to the foregoing, the mill is equipped with a complete time and watchman's system which has 24 magneto stations with registering dial located on the switchboard in the engine room. Each floor of the mill is equipped with two marble dial electric synchronous clocks, run in conjunction with the tower clock, the latter having four 8-foot illuminated dials located in one of the front towers. In the other tower is a 5,000-pound bell and striker. The bell bears the following inscription:

"He never fails who trusts in God,
To him no chance is lost,
God's will is sweetest to him when
It triumphs at his cost."

The clock system is controlled by a master and program self-winding clock on the switchboard in the engine room. In connection with this is a complete striker and fire alarm system operating on the bell above, with boxes located throughout the villages of the Olympia, Granby, Richland and Capital City mills. Energy is supplied to the system by a small motor generator, and a storage battery taking its primary current from the main generators.

The motors throughout the mill are of the inverted induction type, with starting resistance in the rotor. All motors are suspended from the ceilings on steel beams to avoid shrinkage and warping incidental to timber supports. The following motors are used:

Ten of 150 horsepower for spinning.
Five of 150 horsepower for carding and roving.
One of 150 horsepower for pickers.
Four of 150 horsepower for looms.
One of 150 horsepower for clothroom machinery.
One of 30 horsepower for slashers.
One of 20 horsepower for openers.
One of 20 horsepower for machine shop.

All the 150-horsepower motors have a speed of 600 revolutions a minute on no load, and 558 revolutions on full load. The motors driving the spinning connect directly with the shafting on both ends of the motor shaft through flexible couplings. These couplings contain large rubber cylinders that take up the jar incident to the starting of the motors, beside compensating for any slight settling that would tend to throw the motors out of line with the shafting. Motors belted to shafting have pulleys on both ends and are belted both ways, thus equalizing the strain on the bearings. The smaller motors run at higher speeds and all drive through belts and shafting.

The maximum power required in the mill is about 3,300 horsepower, and this power is so divided among the various motors that the largest shaft in the mill is 3 inches in diameter, and six inches is the greatest width of belt.

BABBITTING A BOX.

First make sure that the box is clean and free from grease. Warm the two halves of the box, and also the shaft or journal to from 150 to 200 degrees. This is done to prevent the babbitt from becoming chilled when it is run into the box, causing the wavy appearance which oftentimes is noticeable.

Use fire clay mixed to the consistency of putty for filling all crevices around the ends of boxes. A neat method of obtaining a smooth edge on boxes is to insert writing paper sized with graphite between the box and the clay. Always be careful to have the babbitt hot enough to quickly ignite a soft pine stick. Never pour the babbitt piece-meal, but have a ladle holding enough for the entire box. Provide an air vent from bottom, if babbitting both parts at the same time.

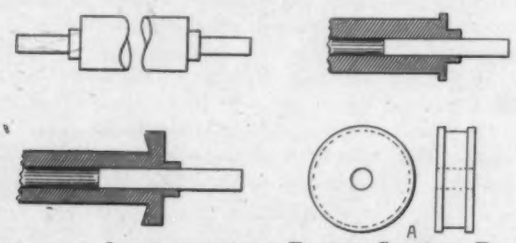
After cooling, cut the necessary grooves and trim off the rough edges. In babbitting the main shaft on an engine I should proceed in the same manner as when about to line up an engine. First, jack up the shaft, level it, and then block it up. If the frame is not already level make it so. Then when shaft is level, line it by any of the well known methods, with valve seat, if true, or by centering a line through the cylinder and bringing the shaft at right angles to the line. Even when taking every precaution babbitting is a very difficult task and it is often hard to get just the results wanted.

The statistics of cotton spinning and weaving in the Indian mills last year for the months from April to November, inclusive, compared with the same period of the previous year shows a decrease of 9,454,557 pounds in yarn spun, and an increase of 101,251,850 yards in woven goods.

RUBBER COVERED ROLLS.

Rubber rolls are used for many textile purposes, but principally for squeeze rolls on dyeing and starching machines and their accessories. When used in conjunction with a brass covered roll, they produce a very even squeeze and distribute the dye or starch evenly through the goods, and in many cases they wear much better than any other rolls to be procured for this work. The rubber used is never pure rubber, but a composition of varying degrees of hardness according to the kind of work for which they are intended. Thus a No. 2 grade is used for cold water and is comparatively soft, while Nos. 3 and 3½ are each harder and better adapted for boiling liquids. In dyehouses where much work is being done in the piece-goods line there are many spare rolls kept in stock, and these must necessarily be kept in good condition, and the cost of re-covering a roll 12 inches in diameter, and 50 inches face is in the neighborhood of $100, beside the freight, which in the South is quite an item, as it means about 3,000 miles of railroading to get the work done.

The best way to care for these rolls is to have a rack made on which to keep all the rolls not in the machines. This rack should be so constructed that the rolls may be supported by their journals only, while the rubber face is carefully wrapped in burlap or paper. In locating the rack care should be taken to select a cool damp place and also a light place, so that the roll may be found without trouble. It is necessary to keep the journals well lubricated to prevent them from rusting. Always keep a record of each roll, so that its life may be watched and studied, and if



Details of Construction of Rubber Covered Rolls

it is found that rolls of a certain grade always "go to the bad" quickly in certain machines, it is probable that the grade used is not the correct one for the work, but if there is trouble with different grades in the same machine, then it is evident that the trouble is with the machine or the men who run it.

A convnient way for the master mechanic to keep tab on all this is to use an ordinary card index file divided into four sections. Section one, rolls in stock; section two, rolls in use; section three, rolls in shop and section four, rolls to be re-covered. Number every machine and have the number painted on a sign and fastened in some conspicuous place about the machine. Then number every roll with steel stamps on the end of the journal, using some distinctive mark as Z31, Z32, etc., as every time a roll is re-rovered it will be stamped with a number by the factory and if a simple number were used they would sometimes become mixed. Then issue a card for each roll in the place, using this same distinctive mark, which should be placed on the tab of the card, thus making it easy to find. These cards are then assorted under their proper heads and work in this manner.

The boss dyer reports that the roll in No. 10 machine is marking off on the goods and by this he means that because of spots or uneven places on the face of the roll the dye is not being squeezed out evenly thereby leaving light and dark spots of streaks. A glance at the end of the roll will give the number, or it may be found by looking over the "rolls in use" cards, which shows this roll to be, say, Z27. It is also noted on this card that the roll is 8x44 inches; grade 3½; that it was put into No. 10 machine on April 9, 1904, and that it had been to the shop to be buffed off just prior to that date. This card is now marked with the proper date, say, May 16, 1904, and the words "shop to buff" and dropped into the "rolls in shop" section, while another card is selected from the "stock" section for a roll of proper dimensions.

Assume this roll to be Z38, 8x44, grade 3½, and on this card is written, May 16, 1904, No. 10 machine. A shop order is now issued instructing them to place roll Z38, 8x44, in machine 10 and to buff the roll taken out. When this roll Z27 is buffed, it is placed in stock and the shop foreman returns the original shop order with the data written on the back to the effect that roll Z27 has been buffed and placed in stock and to this information is added a note stating the general condition of the roll, unless it should be very bad when the attention of the master mechanic is called to the fact while the roll is still in the lathe. The card for this roll may now be changed from the shop to the stock sections and any notes added that the master mechanic deems necessary.

Later on suppose that a roll wears out and that the master mechanic has something like this as a record of the roll written on the card.

Z34, 8x52 ins. Grade, 3½. B. B. Co.
Re-covered and received, June 4, 1902.
June 26, 1902.—No. 1 machine.
Aug. 8, 1902.—Shop to buff. Marked.
Sept. 9, 1902.—No. 13 machine.

It will continue like this until the roll has to be again re-covered. From this card many conclusions may be gathered and by keeping it and others for future reference and comparison, better results will be attainable. Whenever a roll is condemned it should be boxed up for shipment and its card placed in the No. 4 section. When boxing rubber covered rolls for shipment always have the box made in halves. Make the box large enough so that the re-covered roll will have plenty of clearance at the sides when sustained by its journals on blocks provided for that purpose. The two halves are fastened together by two cleats at each end of the box, preferably fastened with wood screws.

Rubber covered rolls vary somewhat in construction, but the same general plan is followed. The body of the roll always is of cast iron and for an 8-inch roll is about 5 inches in diameter.

The surface of the iron body is always roughened after turning, generally by cutting threads about eight to the inch over the whole surface that is to receive the rubber. Some have dovetailed grooves about ½-inch wide and ¼-inch deep planed lengthwise of the body after the threads are cut. Others have dove-tailed flanges, and still others have the threads cut on the ends and the rubber carried down to the collars.

Journals are usually short pieces of steel shaft driven into a bored hole at each end, on rolls of the size mentioned. On the larger rolls, a cast-iron shell is forced on heads which are forced on and keyed to a through shaft. The accompanying drawings will give an idea of the construction of the smaller rolls. When the iron centers are ready, the rolls are shipped to the rubber manufacturers for covering. The rubber cover is put on in sheets approximately ¼ of an inch thick. Each sheet is cemented down, the joints broken and the material vulcanized to the proper grade for the work. Under ordinary conditions of running these rolls get soft or hollow at about the point where the selvage of the cloth runs and it is then necessary to buff them down true. This may be done in a grinding machine, or a lathe may be rigged up for the work by clamping a grinding wheel and stand to the carriage and driving from a drum erected over the lathe. A soft wheel of No. 40 emery gives the best satisfaction for this work, although some prefer to make their own wheels. In doing this a cast-iron disk about 10 inches in diameter and 1¼

inch thick, finish size, is made with the face turned, as shown at *A*. In the groove thus formed is wound cotton cord laid in hot glue and this is coated with several coats of No. 40 emery and hot glue.

When the face of the roll is badly injured, as by a nail or other hard substance passing through the "nip," it becomes necessary to take a cut over the roll, using rather slow speed, coarse feed and an ordinary diamond point tool with considerable rake, stoned up sharp and tempered very hard. The roll will not be straight when turned as the wear of the tool will be considerable, but it can easily be straightened with the grinding wheel. Where a grinding fixture is not available, the roll may be finished by blocking No. 2 sandpaper across the roll from end to end, using coarse feed and running the roll as fast as possible without burning the sandpaper. If the roll is large at one end, block from that end until the size is reduced to normal. As rubber covered rolls, or any other soft roll is very deceiving when calipered, it is a good idea to get the sizes by using a pocket steel tape. By this means the difference in circumference is attainable within a small limit of error and as the difference shown equals the difference in diameter multiplied by 3.1416, it at once becomes evident that close work can be obtained by this method.

When in use the rolls are subjected to considerable set or pressure applied by levers and weights, or springs and screws, and when not in use this pressure should be at once relieved and the roll raised clear of the brass roll, otherwise the brass roll will cause marks on the rubber face that will show in the work. Should a journal work loose, as sometimes happens, the roll should be placed in the chuck and steady-rest, the old journal drilled out and the hole trued for a new one, which is driven in and recentered before the journal is turned. If the roll has a bare collar, the steady-rest may be placed on this, but where the rubber comes down too close, it becomes necessary to place the steady-rest on the fact of the roll and in event of this it is best to make some special jaw caps, at least 4 inches wide and as long as can be used, so as to reduce the pressure on the face per unit of area as much as possible while doing the lathe work.

In ordinary rubber covered rolls with a length of face of 72 inches or over, special specifications should be provided for the preparation of the iron core, otherwise it is liable to be made so small and light that the set applied to the journals will have a tendency to spring the roll and make the goods come out wet in the center. Increasing the diameter of the core is the best way to overcome this trouble. A difference of opinion exists concerning the thickness of the rubber covering for rolls, but the writer's experience is that 1½ inches, while more expensive at first, is cheaper in the long run, particularly if the distance from the plant to the rubber works is a long one. In handling finished rubber rolls, rope slings are better than chains, and even these should never be looped around the face of the roll, but hung over the journals at each end, and a distance piece provided to keep the rope from cutting into the ends of the rubber covering.

Before buffing, if the roll is from a dye machine, it will pay to wash the face with a hot caustic soda solution to remove all gummy substances, otherwise the grinding wheel will become coated and burn the roll every few inches all the way across the face. In doing the grinding, should the roll show chatter marks, reduce the speed of the roll. Use the coarsest feed possible on the lathe at all times, as the work is done more quickly and just as well. The softer the grade of rubber used, the faster the roll may be rotated up to a certain limit, when it will get too hot. There can be no specified rule given for these speeds. The operator must use his own judgment and learn by experiment what speeds best serve his purpose.

On machines with screw and spring set, rubber springs are often used and a great deal of extra work is thus caused by carelessness by the machine tender in screwing on the set. They like to screw down one end until it is about right, and then the other end of the roll which is often an inch or more above the brass roll is run down to its proper set. This makes the set at the first end much too tight, a fact usually not discovered until the boxes are melted out, or some other serious accident happens. When large blisters appear on the face of the roll, they are generally caused by the rubber leaving the center in spots. and if this is the case the only remedy is to have the roll stripped and recovered. Sometimes, however, the blister is only one or two laps deep, and is where the cement has let go. This can be turned out and the roll used again. Specifications should call for the same grade of rubber cover down to the shell, otherwise it will sometimes appear to be different when the roll gets old and the cover is partly turned off.

SIZING GRAY COTTONS.

WILLIAM WHITTAM.

The following discussion of English methods by so well known an authority will be of such wide interest to American mills that we are reproducing it from the U. S. consular reports almost in its entirely.

Before American cotton manufacturers can expect to secure and retain any appreciable share of the foreign trade of the nonmanufacturing world they must learn where the largest buyers and users reside, and the kind of fabrics they demand. To the well informed practical man it is known that gray goods can be turned out most readily by the greater number of American mills. Keeping this in mind, it is instructive to find that during the calendar year ending December 31, 1906, British exports to India were made up as follows:

Of gray cloth, 1,418,024,100 yards, or 62 per cent of Britain's total exports of this class of fabrics for the year, and gray cloth formed no less than 37 per cent of her total exports of cotton cloths of all kinds. Of bleached cloth, 518,037,500 yards, or 30 per cent of the total exports of bleached goods. In printed goods, 341,227,900 yards, or 30 per cent of the printed cloth outgo. In dyed cloth, 229,379,300 yards, or 20 per cent of the dyed fabric exports. India's total takings from England were 2,506,668,800 yards, which is 40 per cent of the entire British exports of cotton cloth. Not only did this great market absorb such a large proportion of British cloth exports, but it also imported 39,860,800 pounds of cotton yarn from Lancashire, equivalent to 19 per cent of the United Kingdom's total exterior trade in this commodity.

To make clear the preponderance of gray cloth over other sorts the British shipments to India show the following percentages: Gray, 56.6; bleached, 20.7; printed, 13.6, and dyed, 9.1. If the purchases of China, Java, Manila, and Japan are added to the total for British India the astounding total of 3,436,400,000 yards of cloth and 54,700,000 pounds of yarn are obtained as the year's exports to the Orient. These represent 55 per cent of England's foreign sales of cotton cloth and 26 per cent of her outgo of yarn. The figures emphasize the importance of India as a customer, as against India's imports of 2,506,668,800 yards the other oriental countries bought but 929,731,200 yards.

BULK OF GOODS HEAVILY SIZED.

This class of goods is important to the managers of American cotton mills, first, because it shows the greatest field for trade expansion and one as yet practically untouched and certainly unworked by the textile concerns of the United States; and, second, because more than half the enormous takings can be profitably made by them and shipped direct from the loom to the foreign purchaser. The fact that no preferential tariff operates against America in any of the markets enumerated is of vital importance. It is likewise important to know that the vast majority of these are either "medium" or "heavily sized." One British authority states that "It is not an exaggeration to say that two-thirds of the looms of Lancashire are engaged in manufacturing goods the yarns of which carry over 40 per cent of size."

CLASSES OF GOODS SIZED.

American weavers have had generations of experience in the production of what are known here as "pure-sized" cloths, but as yet they

have no notion of the details of the process of sizing goods with from 20 to 200 per cent. Before going into the practical details of work such as this, the standard, medium, and heavily sized gray cloths manufactured in England and the leading countries to which they are sent are now given:

Dhooties, as stated in a previous report, vary from fine "pure sized" to coarse heavily sized fabrics. Most of the trade, however, is in cloths which fall in the medium and heavily sized shirting class. Their use is confined almost altogether to India.

Export shirtings are usually heavily sized, some sorts carrying over 150 per cent of size in the warp. They are purchased freely by merchants in India and are also taken by China, Aden, Turkey, Japan, Manila, and Singapore. The pieces are 37½ yards (long stick) and from 38 to 50 inches in width, although the demand for pieces over 45 inches wide is not great. Sley and pick range between 48 by 48 and 64 by 60. Particulars of standard makes and their selling prices on February 14, 1907, were:

Warp and filling or weight of piece.	Width	Length	Sley	Pick	Price per piece
	Inches	*Yards*			
30s-30s	38	37½	48	48	$1.44 to $1.65
36s-36s	38	37½	64	56	1.47 to 1.68
8¼ pounds	39	37½	64	60	1.71 to 1.95
9 pounds	44	37½	64	60	1.89 to 2.14
10 pounds	50	37½	64	60	2.16 to 2.40

T cloths form another group of heavily sized cloths, their lengths being always 24 yards. They are shipped mostly to Latin America, Japan, China, India, and southwestern Europe, the regular makes being:

Weight per piece.	Width	Length	Sley	Pick	Price per piece
	Inches	*Yards*			
4 pounds	36	24	48	40	$1.04 to $1.18
6 pounds	32	24	56	56	1.16 to 1.34

Mexicans are made up into 24-yard pieces and carry considerable quantities of adulterants in the warp. They vary from 28 to 39 inches in width and are distributed in the Orient, India, and South and Central America. Typical fabrics of this class are:

Weight per piece.	Width	Length	Sley	Pick	Price per piece
	Inches	*Yards*			
7 pounds	30	24	72	72	$1.44 to $1.64
8 pounds	30	24	72	72	1.57 to 1.82

Domestics and drills.—The former are medium to heavy sized cloths, while drills range from high medium to heavy sizing. They are shipped to the East, Southern Europe, and South America, while domestics go principally to the Levant, Italy, Turkey, Egypt, and South America, 28 to 39 inches wide, 60 to 96 yards long, warp from 18s to 26s, and filling from 18s to 40s, 54 to 60 sley and pick square.

Madapollams are another medium-sized sort taken by Southern Europe and Latin America. India, however, is the largest consumer of this sort. They are 24 yards long, 28 to 32 inches wide, and from 40 by 40 to 48 by 48 sley and pick. The price of middling American cotton on February 14, 1907 (Liverpool classification), was 12.06 cents. This will enable American manufacturers to more readily arrive at their competitive efficiency.

AMERICAN MANUFACTURERS NOT COMPETING.

At the present time the United States produces nothing that will meet the requirements of the user of sized goods. Neither in "feel" nor appearance do any of the regular products of American mills approach those goods of competitors which have an established reputation of long standing. Although many Americans export grays or browns, as they are known in the States, despite their higher intrinsic worth due to their comparative freedom from adulteration, they sell reasonably near the same prices as British medium sized cloths, yet, as will be obvious to every manufacturer, the added weighting material in the foreign commodity materially reduces its cost to produce, and so long as the purchaser is not only satisfied but prefers the weighted fabric on account of its fullness and feel, American manufacturers can not hope to grapple with their foreign rivals with any satisfactory measure of success unless they turn their attention to similar manufacturing.

Not only for a considerable period after the introduction of the factory system and the power loom, but for centuries before that time, the sizing of warps before weaving was universal. The only object then was to impart sufficient strength to the threads to enable them to withstand the friction and strains incidental to their manipulation in the loom. This plan with the same object in view is followed in modern manufacturing establishments where the products are to be bleached or dyed. Later it was discovered that by modification of the size mixing, fabrics to be sold and used in the gray could be given a certain desirable "feel" and appearance which would enhance their popularity with the consumer.

Subsequently, as British production increased in volume and new outlets were imperatively sought it was found that cloth to come within the purchasing power of millions earning very scant wages could not be produced from pure cotton. This led to the gradual increase in the proportion of size formerly put on the warp until the deception became evident, leading at length to a system which still holds at this writing between the foreign dealer in the country where such goods are used and the shipper in the country of origin. The latter gives the maker full particulars of the counts of warp and filling, sley and pick, width and length, and either the weight of the finished piece or the per cent of size to be added. In this way the abuses and dishonesty of thirty or forty years ago have been almost entirely corrected and abolished.

PERMANENT DEMAND.

For the last two or three decades this important section of the trade has been carried on with nearly complete freedom from fraud. For many purposes, especially in tropical and semitropical countries, there is a permanent demand for "brown" cotton cloths at prices which can only be met by size adulteration, and as these goods are never washed, they serve for certain purposes fully as well and possibly better than the open and bare pure sized sorts of equal counts of yarn and ends per inch. In the United States one occasionally hears the justice of this practice questioned, but enough has been said in these reports to justify the making of cotton stuffs to meet an existent demand, especially when it is known that the proportion of weighting material present has a direct bearing on the price paid. To a consumer earning but a few cents a day a difference of one cent a yard on a number of yards is an important consideration, and such a reduction can only be brought about by the addition of cheaper substances than cotton.

There is a slow but noticeable decrease in the output of the heaviest sized cloths, due it is said, to the slowly increasing purchasing power of the people who use them. They are thus able to pay slightly more for goods containing more cotton and less foreign matter. The pith of the question is, however, that for very many years the consumption of weighted goods will be enormous and that they can be made by a large number of American mills at a figure which will yield a profit to their owners and place the cloths so made at least on a price level with the products of those who now control the markets in which the goods are sold.

This rather lengthy but necessary introduction leads up to a consideration of the materials used and methods employed in applying them by the makers of weighted cloths in Lancashire. Many substances are used which are little, if at all, known to the cotton trade of America, yet no considerable difficulty should be encountered in obtaining them, since they are nearly, if not all, made and marketed in the United States for use in other industries.

APPLICATION OF SIZE.

Size is applied to the warp in the "slashing machine" in all mills making uncolored goods, and it will require few if any changes—and these of a minor character—to the "slashers" now working in American mills to enable them to take up the manufacture of medium and heavy sized cotton textiles. About the only capital outlay required is for suitable size-mixing apparatus, which will be described further on in this report.

In English practice sizing is classified under four heads, each embracing fabrics carrying a certain range of size percentages, the grouping being:

(1) "Pure" sizing carrying up to 15 per cent on the warp.
(2) "Light" sizing carrying 15 to 30 per cent on the warp.
(3) "Medium" sizing carrying 30 to 55 per cent on the warp.
(4) "Heavy" sizing carrying 55 per cent and upward on the warp.

"Pure" sizing.—As the system of "pure" sizing is well nigh the only one followed in the cotton weaving departments of American mills, and as it does not come directly within the scope of this report, only brief mention will be made to this group in which the principal aim is to add as little foreign matter as possible to the yarns consistent with good weaving. Most English-made cloths of this character are either dyed, printed, or bleached after they leave the loom. In the bleaching process all the added size materials are removed; any excess consequently not only increases the cost of sizing to the manufacturer but at the same time the expense of bleaching is appreciably increased. In American mills both coarse and medium-weight fabrics which are sold and used in the gray or brown state are also "pure" sized. This for reasons already enumerated makes their manufacture more costly than the heavily weighted products of foreign competi-

tors, resulting too in an abridgement of America's competing power in foreign marts.

"Light" sizing.—Under the head of "light" sized goods are included all that have from 15 to 30 per cent of size added to the warp. The materials of which these mixtures are composed are generally the same as those included in a batch prepared for "medium" and "heavy" sizing, the difference being in the changed proportions of the ingredients; the lighter mixture would include less weighting and deliquescent substances and more adhesive matter. Some weavers, however, prefer a size containing only flour of one sort or another, tallow or other softener and water for this group.

"Medium" sizing.—It has the double object of increasing the weight, and also in many instances imparting to the cloth the equally important characteristic of a good "feel," and is taken to cover percentages of size ranging between 30 and 55 per cent of the weight of the warp. Here again, as in "light" sizing, variations in the proportions rather than in the nature of the materials used in "heavy" sizing are made to obtain the desired results. So that from the several proportions of ingredients to be shortly given for getting different percentages, manufacturers will be able to select the starting point for any efforts they may make to cater for this great trade.

"Heavy" sizing.—This group might be conveniently subdivided into "heavily" sized and "very heavily" sized cloths. Into the first subdivision fabrics carrying from 55 to 100 per cent would enter, while the second subdivision would include all percentages over 100. Indeed, some Lancashire made fabrics contain as high as 200 per cent of weighting matter. Inasmuch as an increase in sizing means but changes in proportions of materials, the comments made upon the treatment of this group will apply in a greater or less degree to the other groups previously outlined in brief.

SOFT TWIST YARNS USED.

When percentages over 55 are put on warps the primary object is to produce a piece of goods having a better and fuller body and appearance, at the same time presenting a more "clothy" feel than could possibly be made at the same cost from pure cotton. Considering that in the manufacture of the very heavily sized sorts 1 pound of warp yarn may have to carry anywhere from 1 to 2 pounds of size, it is not surprising to find that particular attention must be given both to the raw cotton employed and to the quantity of twist put in warps intended for the purpose. American cotton of average length of staple is mostly used, although at times some other and harsher growth is mixed with American in order to get a more oozy and less tightly twisted thread.

In Lancashire it is not often considered advisable to use frame-spun yarns as warps for goods to be very heavily weighted, the reason alleged being the fact that frame yarns are harder twisted than those from the mule, making it plain that the body of the former thread has a more solid character and can for this reason neither receive nor retain so large a weight of adulterants as the softer spun mule product. Again, counts being equal, the more tightly spun thread must unavoidably have a less diameter than one softer twisted; hence, there is a correspondingly smaller surface over which to spread the size. As the ingredients of the size are mostly such as can not be dissolved they are unable to enter and become a part of the cellular structure of the component fibers, and are therefore at the best merely carried on the surface of the yarn and in the spaces between the individual fibers. Lancashire makers of cloths of this kind have for many years striven to turn off gray goods which shall have as full a character as is obtainable from the numbers of yarns used, and as this, they say, is only possible with comparatively soft-twisted warps, it is evident that a portion of the otherwise attainable strength and attendant good weaving properties must be sacrificed, and the makers must perforce put up with all the extra work in both preparatory and weaving operations that this loss of strength necessarily entails.

Notwithstanding the foregoing prevalent British opinion, the writer is firmly under the impression that a stronger size mixture applied to frame spun warps would produce approximately any desired percentage and at the same time fit existing American conditions. Not only so, but the superior weaving qualities of frame yarn would enable automatic looms to be used in the production of the goods, and there would then be no question of the ability of very many of American weaving establishments to quickly command a valuable share of the foreign trade in gray fabrics.

Substances almost without number for use in sizing have been offered and tried from time to time. Many secret preparations under fancy names have proved of little or no value, and their use is by British experts generally attributed to ignorance of the fundamental scientific principles underlying the operation and objects of the process. When considering the value of a material for use as a size ingredient its price must be taken into account, for costly products are debarred. Nor can anything be used without trouble and loss, which will either effect the weaving detrimentally or be responsible for damage to the goods developing after they leave the loom. Materials used are classified as follows, according to the work they are to perform in successful sizing, as adhesive, weighting, softening, deliquescent, antiseptic, and coloring. In each group many materials may be included, the most common of which will be named, particular attention being paid, however, only to those which experience has demonstrated to be most suitable.

CLASSIFICATION OF MATERIALS.

Adhesive materials.—In this class are wheaten flour, farina, cornstarch, sago, soluble starch, and dextrin. Of lesser importance are rice starch and flour, and tapioca. Adhesive ingredients form the body of the mixing and enable the yarn to carry the size. Their glutinous properties strengthen the yarn chiefly by laying all projecting fibres and fixing them firmly on the surface of the threads.

Weighting materials in medium and heavy sizing: China clay (kaolin) is used almost exclusively for obtaining the required weight, although Epsom salts, Glauber's salts, gypsum, and barites are occasionally employed.

Softening materials are many, but tallow is used more often than all the other substances, the more important of them being soaps, glucose, turkey red oil, palm, cocoanut, cotton-seed and castor oils; stearin, Japan and paraffin waxes. All the foregoing have oleaginous properties and as the adhesive and weighting matters, when put on the warp and dried, would rub off, besides making the yarn harsh and hard, the softener in the batch is introduced to prevent these faults occurring, besides giving to the warps a pliable, smooth, and soft feel.

Deliquescent materials are used to keep the sized yarn pliable by attracting moisture to the fibers. This prevents the abnormal loss of flour and mineral adulterants which would otherwise happen by the friction of reed and harness in the loom rubbing an abnormal proportion of the size into powder. These substances are, therefore, in a sense also softeners. Chloride of magnesium is invariably used in heavy sizing, although chloride of calcium and glycerin are sometimes resorted to; the calcium is, however, commonly looked upon as dangerous to good results.

Antiseptic materials.—Owing to the presence of a large proportion of flour on the yarn, aided by a substance having the power of attracting moisture, there is a strong tendency for mildew growth to develop on the finished cloth. In order to prevent or destroy the growth of this fungi "antiseptics" are introduced in the mixture. Chloride of zinc is used almost exclusively in the class of goods we are considering (medium to heavy sized "grays"), although cresylic acid, salicylic acid, carbolic acid, and thymol are occasionally used for the lower percentages.

Coloring materials.—Ordinarily coloring materials are employed to counteract the darkening action of all sizing substances on the yarn, as well as to overcome the yellow shade natural to spun and woven cotton. Blues are used for the purpose.. Recently a practice has been introduced with the object of tinting yarns spun from American cottons to imitate cloth made from Egyptian. Other colors are also given to the warp by tinting the size to reduce the cost of cloths which were formerly dyed, blues, browns, and yellows being the commonest shades.

Appended are prevailing prices on a few of the principal sizing materials delivered to the Lancashire cotton mill:

China clay (good quality), $10.56 per ton (2,240 pounds).

Sago flour, $2.76 per hundredweight (112 pounds).

Farina (imported German), $2.88 per hundredweight (112 pounds).

Sizing soap, $6.96 per hundredweight (112 pounds).

Chloride of zinc, 102 degrees Tw., $1.62 per hundredweight (112 pounds).

Chloride of zinc, 98 degrees Tw., $1.50 per hundredweight (112 pounds).

Chloride of magnesium, $14.88 to $15.60 per ton (2,240 pounds).

Chloride of calcium, $9.60 to $10.80 per ton (2,240 pounds).

Analine blue for tinting, $2.16 to $3.12 per hundredweight (112 pounds).

Bismarck brown for tinting to imitate Egyptian cotton, $1.44 per pound.

Paraffin wax, 4¾ cents per pound.

Any firm beginning the manufacture of weighted fabrics should make provision for regularly and scientifically testing the materials used. For, in spite of their comparative cheapness, less expensive materials are not infrequently mixed with some of them to increase the profit of the maker. Many of the substances debased by this means will injuriously affect the yarns to which they are applied.

Analysis of a simple nature, such as can be carried out by one devoid of previous chemical training, will uncover the practice just mentioned and indicate the kind and quantity of the adulterants. Tests should also be made to ascertain whether each consignment comes up to a predetermined standard of quality and strength. Subsequent comment of the mixing of size batches will bear on the importance of testing.

In Lancashire it is said that experience has proven wheaten flour to be the best adhesive material for general sizing purposes. Formerly it was held by some that starches, despite some of their known inferior properties, were preferable because of their less liability to mildew. This is clearly a fallacy, for the growth of fungi either on the cotton or any constituent of the size mixture can always and with certainty be prevented by the intelligent use of antiseptics. Much of the value of wheaten flour depends upon its correct treatment prior to the injection of the finished sizing mixture into the "size box" of the slasher.

Corn starch is often mixed with wheaten flour in medium and heavy sizing, about 25 per cent of the former being usually blended with 75 per cent of the latter. This course is adopted where it is required to produce a cloth with a harder feel, or for reasons of economy, the mixture costing less than pure wheaten flour. Corn flour is seldom used owing to a difficulty in breaking up its granules by boiling, the antiseptics being therefore unable to come into sufficiently intimate contact effectually to prevent mildew. The other flours and starches are of too little importance to merit attention in connection with the subject under examination.

CHINA CLAY, KAOLIN, ETC.

As china clay has come into such general use as weighting material as to almost entirely exclude other things except where they are occasionally mixed with china clay, it is important that the features to be noted when selecting this substance for weaving purposes be well understood. The material should have a greasy or unctuous feel, it should be free from grit, and have a uniform color. This clay has supplanted other substances on account of its exceeding smoothness, its ready assimilation with other ingredients, and high specific gravity. It is quite as essential to have a clay of excellent quality as to use good flour, and when once a high-standard sample has been selected it should never be deviated from. That this is an important point is evident from the wide differences which exist in the physical properties of the many brands on the market. Variations in weight, feel, and appearance will unavoidably arise when a different—but possibly equally good—brand suitable for lower or higher percentages is substituted. The nature of clays differs to such an extent that some are quite suitable for medium or light work but altogether fatal to good work in heavy sizing, owing to a peculiar harshness they impart to the extra-weighted warp. On the other hand, there are clays which give quite as good results in light, medium, and heavy work.

The amount of water it takes to make a mixing of a given degree of "twaddle" varies very considerably. From all of this it is clear that the selector must exercise great care in selecting a china clay to answer a given purpose. When grit is present in the clay it is not only directly responsible for worse weaving, but indirectly this trouble is aggravated by the gritty particles rapidly wearing out the reeds and harness during weaving. Inferior color usually denotes inferior quality, and this has led unscrupulous firms to add sufficient blue to impart to such clay the whiteness of better qualities. Occasionally traces of iron are found in clay, sometimes in adequate amounts to produce iron stains on the cloth, thus injuring its value.

China clay is boiled to separate it into the finest possible particles, the time required depending upon the character of mixing being prepared. Where relatively a large volume of water is used the boiling period is shorter, as in light and medium sizing. From one to eight hours is the time generally found sufficient. There are large deposits of china clay in the manufacturing districts of the Southern States, many of which are, no doubt, high enough in quality for sizing purposes if they were treated so as effectually to remove all objectionable impurities.

The use of Epsom's and Glauber's salts has been largely abandoned in gray cloth sizing. They are, however, extensively used in weighting bleached and colored cloth and yarns. Barytes, having a higher specific gravity than china clay, has been used in heavy sizing, but its harsh and gritty nature causes the rapid deterioration of reeds and harness, besides imparting these properties to the woven cloth. It is also difficult to fix on the yarn. It may therefore be left out of consideration, as a substance not to be recommended.

TALLOW AND OTHER SOFTENERS.

Of the many softeners used in sizing, tallow is by far the most common, nor is there a size ingredient adulterated so heavily and with such frequency. Such impurities as chlorides of magnesium and calcium, common salt, chalk, soap, barytes, water, cotton-seed oil, bone fat, starch, paraffin wax, mineral oil, and other cheap and deleterious materials are used for the purpose.

Foreign matters such as soap, fats, water, and cotton-seed oil are in themselves softeners and do not damage the cloth, while starch, salt, and the chlorides are introduced to enhance the dealer's profit by increasing the weight. Mineral oils and paraffin wax, however, tend to damage the cloth. As the chlorides of magnesium and zinc are always used in heavy and medium sizing, and tallow having from practical use established its superiority as a softener when used in the same mixing with them, it is not surprising to learn that nearly every one of the numerous attempts to introduce and maintain concoctions broadly known as "tallow substitutes" have resulted in dismal and sometimes costly failures. Nor will soap of any kind compare with tallow (pure) as a softener. Pure tallow should vaporize at from 240 degrees F. to 320 degrees F., the higher temperature being reached in very cold weather and the lower during summer. Its melting point should range between 110 degrees and 118 degrees F., and its flash point should not be below 500 degrees F. Tallow coming within this standard and otherwise pure will set hard and firm on the yarn, increasing its smoothness.

Soaps should never be used in heavy sizing, for while they assist in dissolving the fatty ingredients of the mixing and make them mix well and also cause the china clay to boil "thinner" and spurt less, the magnesium and zinc chlorides always present in the mixing decompose the soap and deprive it of its useful properties, at the same time making the size lumpy and diminishing the antiseptic powers of the zinc salts.

Paraffin wax is used on gray goods only as a softener. Although it does not mix well it has a high melting point, and, setting firmly upon the thread, increases its smoothness. Taken all around it is not so suitable as tallow, and cloths sized with mixings in which the substance has been included have been known to turn a dirty yellow shade when warehoused for a considerable time.

As previous reports have explained the importance of the "dhootie" trade and stated that many sorts are weighted, it may here be explained that the yarns forming the colored borders of many of these goods are sized separately and not run with the gray yarn forming the body of the fabric. They are dressed with the smallest possible percentage. Paraffin wax is useful in a mixing for this purpose, whose base would be sago flour. This mixture will effectually lay the fibres of the yarn and improve the weaving. The colored yarn for borders should also be dried more thoroughly than the weighted gray warp of the fabric. This will retard the development of mildew on the border, and while the zinc chloride cannot be used on colored yarns mildew may be prevented from developing on them by the addition of six ounces of salicylic acid to every 100 pounds of adhesive material.

(To be Concluded.)

BLEACHING OF COTTON WARPS.

When the bleaching of warps takes place only in a small way without the use of a kier, the following is a good practical method either for a set of warps in the long or short chain system, as well as doubled. Make up the bleaching solution in a barrel and allow it to stand until the solution is clear. Skim off any particles which may be on the surface of the liquor. Suppose a degree T W is registered zero for water, then make up the bleach solution to at least 9 degrees. If solution is stronger, make allowance when any part of it is transferred to the machine. Estimating a pail at two gallons, add 9 pails of bleaching solution to the dyeing machine. This, of course, should be added before each run of the warps, the machine being previously well-filled with water and temperature brought to 160 degrees.

Give the warps two runs in the machine; then rinse them in cold water. Allow the rinse water to be drawn off from the machine and fill up with a new bath, in which four quarts of hydrochloric acid is added. The acid acts as a sour to overcome the bleach. Allow the warps to run twice through the souring bath. Allow this to be drawn off, a new rinsing bath should be made up and the warps run through twice again. The trucks should be lined with paper before the last four runs.

In stripping colors, the same method is used if the aniline is attacked by chlorine. Sometimes it is not necessary to heat the bleach liquor over 120 degrees.

WAGES IN ENGLISH TEXTILE MILLS.

PER WEEK OF 55 HOURS.

Men in mixing room	$3.60 to $4.80
Men in opening room	5.04 to 6.72
Card room:	
Oiler and belt piercer	6.00 to 6.72
Waste man	5.04 to 5.76
Strippers and grinders	5.28 to 6.24
Lap carriers	4.20 to 4.44
Drawing tenters	4.80 to 5.04
Slubber tenters	4.80 to 5.40
Intermediate tenters	4.80 to 5.90
Roving tenters	4.56 to 5.04
Jack or fine frame tenters	4.32 to 4.56
Doffers	1.44 to 2.08
Carding overseers	9.60 to 13.20
Under carding overseers second hands)	7.20 to 8.40
Combing overseers	9.60 to 12.00
Comber tenters	4.20 to 4.56
Frame spinning:	
Spinners	3.84 to 4.56
Doffers	1.68 to 2.16
Overseers	8.40 to 9.60
Under overseers	6.72 to 7.68
Mule spinning:	
Spiners (or minders)	8.64 to 16.80
Piecers	3.12 to 5.04
Creelers, or back boys	1.80 to 2.52
Bobbin carriers	4.44 to 5.40
Overseers	9.60 to 13.20
General workers:	
Machinists	9.60 to 12.00
Machinists' apprentices	.96 to 2.40
Warehouse foreman	6.72 to 12.00
Warehouse laborers	4.32 to 5.04
Warehouse cop packers	4.32 to 6.00
Engine tenders	8.40 to 14.40
Boiler firemen	5.04 to 7.20
Bookkeepers	7.20 to 12.00
Superintendents	12.00 to 65.00

There is a wide difference in the earnings of mule spinners. This is due to many conditions—the piecework scale prevailing in the district, quality of cotton and twist per inch, speed of spindles, length of mules, and the physical condition of the machines and their furnishings.

The foregoing rates uncover the strongest reason for the present insignificant position of American spinners in the yarn-exporting trade. There are, however, countervailing conditions in many of our coarse and medium yarn mills which overcome them and enable us to meet our competitors on the numbers and qualities in greatest demand if we make the selling attempt in the proper way.—*U. S. Consular Reports.*

MILL VENTILATION.

Mr. Osborne, the late factory inspector in England, in referring to this matter of ventilation has said that the use of fans, both for blowing in and exhausting air is the cheapest and most effective system for such buildings as weaving sheds, owing to the large cubic space (some containing more than 800,000 cubic feet), and the consequent impossibility of bringing uncontaminated air from the side inlets to the central parts.

The point here made will be appreciated when attention is called to the very wide buildings that are now a part of mill construction. It is the ventilation of the central portion that is the most difficult to obtain.

Another English factory inspector made the remark some time ago that "the figures shown for cotton weaving are of special interest in view of the prophecies freely made not long since to the effect that the increased stringency of the sanitary regulations made in 1898 by the Secretary of State for artificially humidified cotton factories would cause the occupiers of the factories to relinquish the use of artificial humidity rather than comply with the regulations."

"So far from this being the case," he says, "the number of cotton weaving factories with artificial humidity steadily increasd," a fact that, he thinks, shows that the improved sanitation insisted upon has not had the inimical effect upon the industry that some people feared.

He mentions a conspicuous example of a manufacturer who installed at a great expense an improved system of ventilation in his weaving sheds, in which nearly 2,000 operatives are employed. He took a sample of air from the middle of a number of the sheds and found that the carbonic acid therein averaged 7.37 volumes per 10,000 only; a condition as good as that to be found in our best ventilated buildings.

The manufacturer referred to has adopted other improved methods, such as providing a purer steam for moistening purposes and in fitting up electric lighting in place of gas.

RECENT TEXTILE PATENTS.

Prepared for COTTON by Royal E. Burnham, solicitor of patents and counselor in patent causes, 846 Bond building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for ten cents.

848,625. Waste-condenser for combers. Stephen D. Bennett and George Sylvia, Fitchburg, Mass.

848,702. Balling-head for condenser carding engines. William Stott, Rochdale, England.

848,772. Crack-preventing means for looms. Charles F. Roper, Hopedale, Mass., assignor to Draper Co., same place.

848,801. Filling-detecting mechanism for looms. Arthur E. Benson, Providence, R. I., assignor to Draper Company, Hopedale, Mass.

848,815. Stopping and starting mechanism for looms. William F. Draper and Charles F. Roper, Hopedale, Mass., assignor to Draper Company, same place.

848,875. Beating-up mechanism for looms. Charles W. Bates, St. Hyacinthe, Quebec, Canada.

848,908. Method of stiffening pile fabrics. Frederic E. Kip, Montclair, N. J.

848,909. Apparatus for dressing or stiffening pile fabrics. Frederic E. Kip, Montclair, N. J.

848,967. Cotton-picker. Benjamin A. Chew, Augusta, Ga.

848,968. Cotton-picker. Benjamin A. Chew, Augusta, Ga.

849,073. Shuttle-spindle. William Koehler, Fulton, N. Y., assignor to American Textile Specialty Machinery Co., New York, N. Y.

849,141. Cotton-gin. Story B. Ladd, Washington, D. C.

849,163. Loom. James Rigby, Paterson, N. J., assignor of one-half to William Holt, same place.

849,182. Cotton-picker. Willis Adkins, Willis, Texas., assignor of one-half to A. M. Carson, same place.

849,186. Material for rugs, carpets, etc. Fredrich Bartelt, Philadelphia, Pa.

849,212. Self-threading loom-shuttle. Jean B. Daudelin, Fall River, Mass., assignor to John Shambow and Christopher J. Shambow, Woonsocket, R. I.

849,213. Self-threading loom-shuttle. Pierre P. Daudelin, Fall River, Mass., assignor to John Shambow, Woonsocket, R. I.

849,296. Detector device. Simon W. Wardwell, Providence, R. I.

849,295. Tension device. Simon W. Wardwell, Providence, R. I.

Design 35,508. Pile fabric. Frederic E. Kip, Montclair, N. J. Term of patent 7 years.

Design 38,509. Pile fabric. Frederic E. Kip, Providence, R. I. Term of patent 7 years.

SOME ASPECTS OF TEXTILE MILL LUBRICATION.

Authorities on lubrication in general, differ so markedly in their statements, that the layman is at a loss in making comparisons. When to these general difficulties are added the special local conditions as they exist in textile mills, where the spindles, the buffers, looms, spinning frames, top rolls and other parts present each its own particular problem for satisfactory lubrication, a correct solution is most difficult to obtain. Here is added to the question of reducing frictional resistance, the very important point of not damaging the fabrics by means of oil stains.

So called "stainless oils" have been used from time to time, but no oil has as yet been found that is truly stainless in the complete meaning of the term. Before being used they are colorless, but in passing through the bearings they become black and damage any fabric with which they come in contact. The more perfect the adhesion of a lubricant to the moving metal surfaces, the more completely does it satisfy its prime requisite. It must be stated that most stainless oils have received their neutral color and bleached appearance from specific treatment.

What is necessary, primarily, is a true lubricant. That we must have or disastrous abrasion to bearings and serious loss of power will result. The secondary consideration is the damage to goods.

Excellent service is obtained from many kinds of fluid oils, but they all have the defect of not staying on the bearings where they are intended to be of service; dripping and creeping along the shafting, they come in contact with the fabric in process of manufacture. This usually comes by the use of fluid oils of too light a body and by feeding devices that supply too much at a time, causing the bearings to be flooded, not only wasting the oil, but spoiling and spattering everything within reach.

Some years ago tallow greases were resorted to as a substitute for fluid oils. They were much more cleanly to use and completely removed the objectionable dripping of fluid oils and performed the functions of a lubricant in an apparently satisfactory manner and seemed to be economical. But upon careful investigation when scientific analyses and tests were made, it was discovered that greases being not truly fluid but plastic bodies, offered a very high resistance to shearing between their separate layers, so that for the very high frictional coefficient between metal substances of bearings, there was here substituted a still higher coefficient of internal fluid or semi-plastic resistance.

For instance, Prof. Woodbury used fluid oil on one or two rooms of looms in a cotton mill and on the other used grease under the same running conditions. He states that the temperature of the bearings lubricated with oil, was only 40 degrees higher than that of the room, while the temperature of the grease lubricated bearings apparently was 220 degrees higher.

Another case in point is that of a textile manufacturer who used water power and had substituted grease whenever possible for fluid oils, in order to check the damage from dripping fluid oils. The results were highly satisfactory from the standpoint of cleanliness and cost, except that his water power, which had hitherto been ample, was not now sufficient to run his machinery, so that he was obliged to revert to the use of fluid oils.

The frictional load in a large cotton mill with its countless bearings and large lines of shafting consumes at least 50 per cent of the total power. It is essential that this percentage of friction shall not be increased by using greases or any other means of lubrication departing from the true principles of frictional reduction.

What is needed apparently is a lubricant with a low coefficient of friction, which will stay on the bearing and not drip and spatter—a material combining the non-dripping qualities of grease with the excellent lubricating qualities of fluid mineral oils.

There is a class of oils called "NON FLUID OILS" which seems to satisfy these requirements judging from the practical results that their extended use in New England textile mills has shown. These oils are made in every conceivable grade of viscosity, from the consistency of, one might almost say wax, to practically that of spindle oil. But whenever the degree of internal cohesion, they are also marked by an extraordinary quality of adhesion to the metal surfaces to which they are fed as lubricants. They seem to cling to the surfaces until their life and internal parts are naturally worked out.

It is evident that a lubricant that stays in the bearings and does not drip and spatter, that has lubricating qualities equal to the best fluid oils, that can be used economically, no more being applied than is necessary for proper lubrication, is what textile manufacturers have long sought and now is obtainable.

SOLUBLE METAL BOILER COMPOUND.

Safety, convenience and dependable results are the characteristics which engineers especially desire in a boiler compound. New Era Soluble Metal Boiler Compound, besides possessing the three characteristics mentioned above, is claimed to be the most economical boiler compound on the market; and through its electrolytic action it absolutely prevents pitting of boilers, and makes it impossible to waste the compound; for if the Soluble Metal should be dissolved more rapidly than is neutralized by the calcarious deposits in the water, it would be deposited upon the inner surface of the boiler in the form of a protecting metallic film, which in turn would be dissolved to prevent the formation of scale in case the containers should become empty.

This improved product differs from other chemical boiler compounds in the following respects: It prevents the corrosion or pitting of boilers; it prevents boiler scale from clinging to the surface of the boiler; causes that which has formed to become detached and fall and by its solvent properties prevents the formation of new scale, thus leaving the calcarious deposits of the water in a state in which they can easily be carried off through the blow-out.

All engineers, who have had any experience with water purifying systems, are aware of the fact that they do not remove all the scale forming elements. New Era Soluble Metal Boiler Compound is sold as a safeguard against such undesirable results. When used, in connection with purifying systems, to prevent pitting, only a small amount is necessary; and where such systems have not yet been installed, a proper use of this improved product will obviate the necessity of such expense. Complete information can be obtained from the New Era Mfg. Co., Kalamazoo, Mich.

DYE HOUSE TOPICS.

When a union black is composed of a direct black and a small percentage of one-dip wool black and used on union goods if the fabric is treated, after dyeing, with a warm rinsing bath in which a small amount of soda ash is added, it will prevent to a great extent the dye from staining white cotton threads in the fulling process.

Sulphur blues when dyed on warps, should not be allowed to smother too long on the trucks. After the blue is fully developed it should be washed immediately, as long standing makes the color redissolve. The color lake being partially destroyed causes the color to bleed.

The tendering of warps dyed with sulphur colors is due to insufficient washing. The sulphur and sodium sulphite being precipitated and becoming oxidized by the action of the air into sulphuric acid.

METHODS OF TESTING COLORS BY ANALINE MANUFACTURERS.

The determination and testing of colors by the different cloor houses of this country is at the present day a necessary department in their daily routine of work.

A few years ago before anilines reach their immense output both as regards quantity and types, one chemist could easily perform the duties assigned to him. However, at the present day the leading color houses employ at least a dozen for this department.

The term chemist should not be misunderstood, as each of the various houses probably do not have at the outside more than two or three who, by training, are entitled to that degree.

Usually the head of the color department although he may not be a college graduate has a thorough and practical idea of the workings and manipulation of colors and chemicals.

As the mill man is usually well acquainted with the technical and practical demonstrator who ofttimes conducts a test at his mill, it may be interesting to him to have a slight acquaintance with another phase of the business, that is, the testing of the samples as obtained by the salesmen from the mills.

The salesman is usually the one to procure the samples on his trips through his territory. His object is two-fold—first, to bring out a competitive product of the same shade, second and most important, is to find the color—strength, in order to acquaint himself with both products. He desires to know their relative money value so he may be familiar with each when he calls on the mill the next trip.

After obtaining the sample he writes his house fully all information he can get as to the present application of the color, class of goods dyed and price of the dye stuff. Frequently the latter is withheld by the buyer but in most cases the salesman of experience has a knowledge of the selling price.

The dye house upon receipt of sample places on file the number, name of mill and branch office from which sample was received. The chemist in charge of the laboratory looks carefully into all data furnished and often makes a preliminary examination by the following method: procuring a strip of filter paper he allows steam to permeate it or dips the paper quickly into hot water. With a little of the dye stuff placed on a spatula he blows a small quantity upon the paper holding the latter towards the light. If the dye is a combination color or mixture the different particles will respond to their respective shades, especially on the rim of the place where the bulk of the color was placed. If, upon examination there apparently is no mixture, he brings out from his list of colors the one most closely allied to same, both as regards price and strength, or in order to get a better money value, he may try a mixture which will produce a duplicate shade at a lesser cost. The sample is handed to one of his assistants with directions to match it aganst one of their competitive products or any combination which he may see fit to make.

The method of testing is essentially the same in all laboratories. The following procedure is very common: a five gram skein is usually the quantity of stock taken for respective dyeings. A solution is made up of both the sample and the product of the house. One gram of each is usually weighed out and dissolved thoroughly in a small quantity of hot water and afterwards made up to 500 C. C. with cold water. Then 50 C. C. of solution would represent 2 per cent dyeing and 100 C. C. would represent 4 per cent and so on using the number of C. C which in the chemists' judgment would give a satisfactory shade. In two separate breakers the number of C. C. necessary is drawn from the 500 C. C. flask by the use of a pipette. The corresponding chemical is then put into each breaker from a known solution, either made up as a 10 per cent, 20 per cent or any other numerical calculation and enough added to correspond with the type of color used. Water is then added to each of the breakers, usually 10 to 20 per cent of the weight of the stock, one C. C. of water of course weighing one gram. The gas flame is placed under each of the breakers and the solutions brought to a boil if necessary. The skeins of yarn are properly marked inorder to cause no confusion afterwards and are placed in their respective breakers and dyed for, say, one hour. They are then taken out and placed in a drying oven afterwards being submitted to the head chemist or man in charge of the laboratory. He is in a position then to complete further tests if necessary, such as matching exactly the shade of sample submitted.

In making up the solution, a chemist may prefer to use a more concentrated liquid, using perhaps 100 C. C. in which one draw of color is dissolved. Then on a 5 gram skein every 10 C. C. of solution represents a 2 per cent dyeing. This method, of course, does not represent the only plan employed as the different classes of colors on cotton wool and silk require different methods of dyeing the same as in the practical application of same in the mill. For colors requirng a mordent the skeins are first treated with their respective chemicals and are usually placed away for future use. In some classes of colors the comparative dyeings are started cold or at a lower temperature than the boil.

Sulphur colors are usually dyed on a 10 gram skein or sometimes in the raw stock and the dye stuff is weighed separately, usually one gram being taken and placed in each breaker instead of first making a solution. This is due to the fact that sodium sulphide acts as a dissolving agent and should be added to the dye stuff in the breaker along with the requisite amount of soda ash and salt from prepared solutions.

Colors produced from wood or woody matter, such as log wood, cutch, fustic, etc., have their special mode and manner of use; the color test for these is essentially of a different nature and the detail work in connection with the application of different classes of dye stuffs, as performed in a laboratory, although apparently a simple process, would be too lengthy for publication.

PEROXIDE AS A BLEACHING AGENT.

Much experimental work has been done on this product, either as the peroxide of hydrogen or sodium, especially as to its value as a bleaching agent on different fibres.

The cost of the product seems to be the barrier to a more extensive and practical adoption. Peroxide of hydrogen used with soap, magnesia and caustic soda in a bath at a boiling temperature gives excellent results on cotton without the fault of making tender goods as occurs oftimes when bleaching powder is employed.

On woof the goods are soaked at about 150 C. for 12 hours in a 4 per cent solution to which a small percentage of ammonia is added. From a commercial standpoint, it is used principally on hair and feathers.

The Hosiery Trade Journal, Leicester, England, states that peroxide is a valuable agent on mixed yarns containing both cotton and wool. In the old method of submitting both fibres to the same process of bleaching, the process is detrimental to the cotton fibre, practically destroying it. The cotton fibre destruction does not take place immediately but there is a chemical change which through the action of the air and repeated washings ends in the partial if not the thorough destruction of the fibre. *The Trade Journal* further states that having found the cause the next is to find the remedy. In the present case it is clearly shown that it is necessary to adopt some other process of bleaching cotton and wool goods than the sulphur pro-

cess. Of the several methods it would be well to try one of the oxidizing agents for preference the sodium peroxide bleach. The goods after being well soured are steeped for a time (varying according to class of goods, strength and heat of lye), in a solution of the bleaching liquor, of which the following is a fair mixture.

For 100 lbs. to 150 lbs. of goods prepare a bath as follows: 100 gallons of water, cold; 8 lbs. sulphuric acid, 66 degrees B. C.; 3 lbs. ammonia phosphate; 7¾ lbs. sodium peroxide.

The above to be added in the order given while stirring. The whole of the strength of bath not being used up it may be replenished for the second batch of 100 to 150 lbs. of material as follows: Add 8 gallons water; 2½ lbs. sulphuric acid, 66 degrees B. C.; 1 lb. 14 oz. sodium peroxide.

Should the bath at any time show an acid reaction make it slightly alkaline with ammonia.

INDIGO.

As a coloring matter for centuries Indigo has been regarded as one of the most important. Today with all the different types of aniline, Indigo is the standard for all blue. It was used long before the Christian era. Its introduction into Europe took place early in the sixteenth century. At that time colors were produced from wood and when Indigo was first introduced the cultivators of wood used every possible effort to stamp it out. They even went so far as to use influence with the rulers of their respective countries, as they feared for the time that their business would be ruined. We thus see how in the early centuries almost identically the same practices were employed to more or less extent as in the present day among the various dyestuff houses in getting this or that color before the trade.

The largest amount of natural Indigo is produced in Bengal, in fact it is the standard, afterwards comes Oude, and Madras, while smaller quantities are produced in China, Japan and certain countries of South America.

The Indigo crop is very uncertain, depending chiefly upon the rainfall. At the time of sowing—in February or March—a large rainfall would rot the seed wheih necessitates new planting and consequently a later and smaller crop. A drouth is disastrous owing to the nature of the long tap root, which as soon as it reaches a dry layer of soil causes the plant to wither and die.

The important property of Indigo is Indigotine, varying greatly in the natural product as low as 5 per cent and as high as 80 per cent. Besides Indigotine, natural Indigo contains Indigo red. This product has certain properties for coloring.

Synthetic Indigo was discovered by Baeyer in 1885, and his name is always linked with the manufacture of the artificial product. It seems almost incredible that a vegetable product could be produced by synthetic means in a laboratory, but such is the case and today the manufacture of artificial Indigo is known among the textile trade as the greatest achievement of modern chemistry. Today its sale has completely overshadowed that of the natural product and it is only a question of time whe nnatural Indigo will be a relic of the past. However, it seems one cannot form any idea of time of departure of the natural product. Owing to the large increase in manufacturing, the sale of natural Indigo the past year equals that of former years since 1877. Its price today is almost at the highest point known in recent years.

In order to test Indigo on the fibre, the following methods are satisfactory: When the fabric is treated with cold, concentrated sulphuric acid the resulting liquor at first becomes yellow, turns quickly to an olive shade and by slower stages from a green to a deep blue. Add water slowly and the resulting solution stays blue.

Another method is to drop some nitric acid on the fabric. This will cause a yellow spot surrounded by a circle of green. This, however, could not be a universal test as there are other colors which possess the same characteristics.

If a piece of fabric is burned, especially cotton, and the fumes allowed to be collected on a watch glass or porcelain dish, a layer of Indigotine is found.

COLOR MIXING.

Not more than four colors at the outside are used to obtain a shade, usually three are sufficient. Shades produced by dull colors are more easily matched. Mills of today as a general rule, especially in the Southern States, buy their own drugs already mixed. This, of course, does not hold true with large manufacturing plants where competent dyers are employed. They as a rule prefer using the simple colors and make their own mixtures.

The primary mixing colors are red, yellow and blue. It is utterly impossible to go into detail in this short article, taking the primary colors and the secondary shades, with the resulting effect of their different mixture and colors to be obtained thereby. As illustration of some specific mixture, the following may be of interest:

Red and yellow give an orange.
Red and blue give violet.
Blue and yellow give green.

Suppose, for example, we get a shade of green by using 50 parts of yellow and 50 parts of blue, by increasing the yellow we get a yellow green to a green yellow. By increasiing the blue we get a yellow with bluish green to a greenish blue. Orange today is a very cheap drug and is one of the lowest priced in the list of dye stuffs, so consequently it is best to buy the straight type. It can be produced however, best with red of yellowish cast and the yellow of the green cast.

Yellow, blue and red make black. Black, of course, is never produced in a mill by these means and this mixture is only interesting from a color-mixing standpoint. Where black is used as a base the following shades are produced:

Black with red gives maroon.
Black with orange gives russet.
Black with yellow gives brown.
Black with yellow-green gives olive.
Black with blue gives slate.

Plum, brown and olive shades however, are best obtained by mixing orange, red and green.

Naturally in a practical manner, only a few of these mixtures are made, depending wholly upon the selling price of a straight type color or whether a mixture can be sold at much less figure.

Compound colors, orange, green and violet, vary in shade based upon the amount of component parts used, as also the purity of their respective tones. An example would be as follows:

Suppose we are to produce a green, should the yellow incline to orange and the blue to purple, we will get an olive green. It is not possible to go further into this subject of color-mixing as the resulting shades, obtained by mixtures, are almost beyond the scope of reason, but in all cases the fundamental base is that of the primary and secondary colors.

LIVERPOOL WOOL SALES.

At the public sales of East India wool held in Liverpool from the 19th to the 21st inst., 19,900 bales were brought forward, 18,300 bales of which found purchasers. America is credited with having secured 1,200 bales, and the Continent of Europe 5,300 bales, the remainder going to the home trade. Broadly speaking, prices advanced 5 per cent in average above the level established in the previous auctions held in January.

Charlotte District News.

FROM OUR SPECIAL CORRESPONDENT.

Charlotte, N. C., April 5, 1907.

That there is a wide spread tendency among the mill men themselves to lower the hours of labor in the mills, is evident from the fact that a number of local cotton mills have definitely decided to begin a gradual reduction. Mr. Arthur J. Draper, secretary and treasurer of the Chadwick, Haskins, Louise and Dover Mills, has stated that his mills intended taking such a step. He made this statement first in a public address before one of the improvement or good citizen's clubs at his mills. This club is composed of citizens of the mill village of Chadwick and largely of people who work in the mills, or are interested in it in one way or another. He was speaking of improvements contemplated for the village and of the efforts that the management intended taking to better the life of the people, to aid them to have a better time, to make improvement and get their share of the good things of life.

When asked by your representative what steps he intended taking in the matter of shorter hours, Mr. Draper said, that his mills would begin at once by reducing from sixty-six to sixty-four hours a week, that this schedule would prevail until the first of July. Then two hours more would be taken off of the week's work, and sixty-two hours would be the system until the first of January, 1908. Beginning with the new year sixty hours will constitute the week's work.

Thus it will be seen that Mr. Draper is going about the matter of improved conditions in a manner that means something. The conditions of living about his mills are already most desirable, and these extra hours given to the mill people for their own amusement or improvement will add much to the pleasure of the people.

It is understood that the Atherton Mill of which Mr. D. A. Tompkins is president, and which is one of the largest mills in this section, will also reduce from sixty-six to sixty-four hours a week and gradually work down to sixty. Doubtless many other mills will fall in line, as they are able financially, and from the point of view of sufficient labor to do so.

This voluntary action of some of Charlotte's leading mill men and citizens is being generally commended by the business men, philanthropists and newspapers of the city. It is remarked too, that it is a movement that is general all over the state. Formerly, all mills ran seventy-two hours per week. Now the maximum in the state is sixty-six hours per week. In some places it is sixty-four, in some others it is sixty-two, and in a few of the mills of the state, the low limit of sixty hours a week has been reached.

It seems that the movement for a ten-hour day is general throughout the Piedmont region. In the machine shops, trouser factories, knitting mills, furniture factories and other manufacturing plants generally, the week's work is sixty hours, and the tendency in the cotton mills is towards the same direction. The sentiment of the mill owners, seems to be generally for the reduction of the week's work to sixty hours, but in many cases it is not practicable to do so at once, and the movement will likely require some time before it is brought uniformly to the low limit. There are many small mills where the conditions may not justify immediate action, even for a small reduction, and yet these mills have in the aggregate, a large number of the working people.

The movement for the abandonment of night work is also gaining rapidly. It is very plain though that no general movement for the abandonment of night work could be carried out at one time. Those mills which have been running at night have already in many cases, put in additional machinery in order to get rid of the night time, and yet not discharge any of their working people. A number of the mills are now occupied with enlargements without any purpose of trying to increase their production, but only with the purpose of shutting down at night, and giving employment to the night operatives in the day time.

Thus it will be seen that the general tendency in the state and community is notably to better the conditions of the mill operatives, and the reduction from seventy-two hours a week, which was generally in vogue only a few years ago, to the present maximum of sixty-six and minimum of sixty, shows only admirable progress in the most important industry in the state.

J. E. C.

New Machinery and Trade Notes.

LARGE WATER WHEEL CONTRACT.

There is no doubt but that DDayton Globe Iron Works Co., holds a very enviable position among the water wheel manufacturers of the United States. The output of this concern last year exceeded any previous year in its history, and indications are that the present year will break all former records.

The most important contract thus far for 1907 is one just closed with the Aluminum Company of America, for their plant at Massena, N. Y., which was formerly owned by the St. Lawrence River Power Co. This contract includes twenty-four turbines, which, when installed, will develop twenty-four thousand horse power.

The shipment will aggregate 750 tons, or in the neighborhood of sixty carloads. The work is to be shipped from July to October of this year and will be installed in the place of another type of turbine which has failed to meet the up-to-date requirements of electrical transmission.

THE MONARCH ELECTRIC MFG. CO., Warren, Ohio, has issued a neat, clever circular, pertaining to their electric lamps. They will gladly send on request to anyone interested one of these circulars and a sample lamp or two.

WE HAVE JUST RECEIVED from the Lombard Iron Works and Supply Co., Augusta, Ga., their late catalog. It treats very clearly and entertainingly on their horizontal tubular boilers, giving complete dimensions, horsepower, weights, etc. The catalog is printed on excellent enameled stock, and contains important data of value to those interested in boilers.

THE PHILADELPHIA WATER PURIFICATION CO., Philadelphia, Pa., are out with an interesting and valuable booklet describing their filters. Their filters are of both the pressure and gravity types, used as circumstances warrant. Adapted for private houses, hotels, hospitals, public buildings, textile industries and manufacturing plants of all kinds where a filter is requisite. The booklet is illustrated. Will be sent to anyone upon request.

FROM UNDERFOOT TO OVERHEAD.—This is the title of a beautiful new phamphlet sent out to the trade by the American Sheet & Tin Plate Co., Frick Bldg., Pittsburg, Pa., handsomely illustrated from both photographs and drawings. The pamphlet takes up the manufacture of tin beginning with the removal of the iron ore from the Mesaba Dsitrict in Minnesota through various stages by steam shovel, railroad train, whaleback, etc., to the final packking of MF, US, IC and IX tin plates ready for shipment. The pamphlet will be found of interest to every tin user. Besides the foregoing, there is information regarding the amount of tin required for roofs of various dimensions, of material for roofs, etc., etc.

WILDMAN MFG. CO., Norristown, Pa., are issuing a handsome catalog bound in cloth and printed on heavy enameled stock. It treats very exhaustively on their knitting machines and improved circular automatic rib machines for hosiery and underwear. The book shows illustrations of the machines and standard attachments, which can be ordered by number. The catalog is handsomely gotten up and would do credit to any textile library.

HARDIE-TYNES MFG. C., Birmingham, Ala., have sent us their latest catalog. It shows their Corliss engines for all kinds of service. Gives tables of sizes, speeds, indicated horsepower, etc. It will be found of value to every man interested in engines. Ask for catalog No. 2.

CORTLAND CORUNDUM WHEEL CO., Cortland, N. Y., are distributing their latest catalog descriptive of their Corundum wheels. It tells of the different processes employed, with handsome illustrations. Gives dimensions of standard wheels with prices which will be greatly appreciated by the trade. This catalog will be mailed gratis to anyone asking for it.

SPENCE & RIDEOUT, Nashua, N. H., have sent us their late catalog. It describes very thoroughly their hydraulic and power presses, with illustrations. It contains a long list of prominent manufacturers now using their presses, together with many testimonials. The book will be found of value to manufacturers of woolen and worsted goods, shawls, cloths, hosiery, and all kinds of goods which require to be hot pressed. Spence & Rideout also make steam boilers, rotary bleachers, water and oil tanks. They have special catalogs pertaining to these different lines, and will gladly send catalogs free of charge to anyone interested.

REVERE RUBBER CO., Boston, Mass., are sending out a handsome book calling attention to their high grades of belting, hose, packings, blankets, valves, springs, and all rubber goods for mechanical use. It is profusely illustrated and quotes sizes and prices. Those desiring can secure copies by addressing the Revere Rubber Co.

THE TRILL INDICATOR CO., Corry, Pa., is distributing an illustrated book about their indicators, reducing wheels and planimeters which contains much useful information about taking and reading indicator cards. It goes into much detail, and rules are given for finding the horsepower, etc. Characteristic diagrams from engines of various types, including faulty diagrams, are analyzed and suggestions made for their correction. This book should be in the hands of every steam engineer.

THE NATIONAL BRAKE & CLUTCH CO., Boston, Mass., have recently issued several pamphlets describing their cork inserts for reducing friction on pulleys and clutches of all kinds. It is stated that thousands of looms are equipped with cork inserts and giving excellent satisfaction. The pamphlets contain numerous illustrations, and testimonials from large establishments. These pamphlets will prove of interest and value to manufacturing plants.

A CHANGE OF COMPANY NAME of more than usual interest to the trade took place April 1, 1907. The Sawyer-Man Electric Co. will hereafter be known as the Westinghouse Lamp Co. Thus the name of the pioneer company in the lighting industry becomes a matter of history. It has of course been understood for some years past that the Sawyer-Man Electric Co. was a Westinghouse interest, and the change of name is but a logical result of changed conditions.

THE CENTRAL HEATING AND POWER PLANT to be completed during the coming summer for the capitol buildings at Washington will contain 9,000 horsepower of water tube boilers. These boilers will be equipped with Foster superheaters, manufactured by the Power Specialty Co., 111 Broadway, New York City. At the recent opening of bids on boiler, stoker and superheater equipment for the above plant twenty-two of the tenders, including that of the successful bidder, offered the above superheater.

THE POWER SPECIALTY C., 111 Broadway, New York City, has secured recent orders for Foster superheaters, aggregating many thousands of horsepower, for installation in various types of water-tube and fire-tube boilers, many of which are repeat orders, from the following: Newnan Cotton Mills, Newnan, Ga.; Illinois Central Railway, Chicago; Tennessee Copper Co., Copper Hill, Tenn.; Canada Turpentine Co.; Cross, Austin & Ireland Lumber Co.; Old Dominion Copper Co.; Columbia Improvement Co., Tampa, Fla.; Bucyrus Company, Milwaukee, and Philadelphia Electric Co., Philadelphia.

THE DAYTON GLOBE IRON WORKS CO., Dayton, O.—We have received catalogs from this company giving descriptions of the different gearing manufactured by them, and profusely illustrated descriptions of the "New American" turbine and also head gate hoisters. In addition they are issuing a vest-pocket edition catalog containing tables and other data regarding the "New American" turbine.

THE FOSTER ENGINEERING CO., Newark, N. J., have sent us a bundle of leaflets describing the construction and action of the "Foster Regulator" for reducing pressures of steam, water, gas, or air, the "Foster Back Pressure Valve," "Foster Float Valve" and other appliances of like kind. Price list and table of dimensions are given in each leaflet.

TEXTILE MILL CHALK CRAYONS.—In catalog No. 67, the Standard Crayon Mfg. Co., of Danville, Mass., describes a large assortment of crayons, among which we notice textile mill chalk crayons made in eighteen colors, which are claimed to be of such a superior quality as to be used in many of the largest mills.

WAGONS, DRAYS, TRUCKS.—The W. P. Horner Wagon Mfg. Co., Danville, Va., in a neat catalog describe fully a large number of drays, wagons and trucks manufactured by them. The catalog states that nothing but the best quality of timber is used in the construction of these vehicles, and nothing but the best grades of oil and paint. The goods are guaranteed.

WATTS' OFFICIAL RAILWAY GUIDE, Atlanta, Ga., for March has just been received, marking the 22nd year of its publication. Thousands upon thousands of miles of railway passenger trains are shown in this issue, the exact mileage, schedules and connections are clearly shown, with the miscellaneous information and hotel directory of the South, making it especially valuable to the traveling public and the business man. Mr. J. R. Watts has well earned the success of his effort, and the tourist and traveler will find it a valuable handbook of information, well worth its price, 25 cents per copy, $2 per year.

Mill Construction and Changes.

ALABAMA.

Alexander City.—It is reported that the Alexander City Cotton Mills have started operations with a capital of $200,000. The plant is equipped with 6,500 ream spindles and 164 looms. C. E. Riley is president; D. A. Carrick, treasurer; and A. F. Luttal, superintendent.

Eufaula.—The Chewalla Cotton Mill has changed hands and is now known as the Barbour Cotton Mill, making shirting and print cloth. Operations have been started and the new company is capitalized at $50,000. R. W. Moulthrop is president and W. L. Wild is treasurer of the company. The factory will be equipped with 6,000 ream spindles and 150 looms.

Oxford.—It is reported that the Blue Springs Cotton Mill has been purchased by the Hoffman-Corr Mfg. Co., of Philadelphia. The new company, to be known as the Planters Mfg. Co., is to be formed to manufacture yarns and cordage. Wm. V. Bailey is president.

Tallapoosa.—A new yarn mill will shortly be erected at this place. 10,000 spindles to manufacture yarn will be installed. The capital stock will be $200,000. C. E. Pearce, now of the Victor Mfg. Co., Fayetteville, N. C., will be general manager.

CANADA.

Montreal.—It is reported that the Mount Royal Spinning Co. is incorporated, with capital stock of $1,500,000. The plant will have 40,000 spindles and 1,200 looms. W. T. Whitehead is general manager. Others reported interested are W. C. McIntyre, C. W. Treholme and J. W. Pike.

CONNECTICUT.

Central Village.—The Central Worsted Co. is installing a new weaving department. Machinery has been ordered and it is expected this department will be in full operation in May.

Danielson.—Davis & Brown Woolen Co. has been incorporated, with a capital stock of $15,000. H. J. Brown is president, and A. O. Davis, treasurer.

Meriden.—The Silver City Braid Co. has been organized, with a capital stock of $50,000. It is intended to have the new plant running in May. Isadore Director is president, Morris May, secretary, and N. E. May, treasurer.

Meriden.—The Textile Braid Mfg. Co., recently incorporated with a capital stock of $10,000, expect to begin operation in April. 150 braiders will be installed and the company will manufacture silk braids, soutache, flat, fancy and diamond braid. H. Adlman is president; E. J. Griffin, treasurer, and C. H. Cheeney, secretary.

GEORGIA.

Columbus.—The Swift Spinning Mills Co. has let the contract for their new building, which will be 178x134 feet, three stories high. It is expected the plant will be in full operation late this summer.

Dallas.—The Monarch Cotton Mill Co. will shortly install 5,000

spindles. It is intended to install a power plant later on to double the capacity of the mill.

LaGrange.—It is reported that the Elm City Cotton Mills are completed and that machinery is now being rapidly installed. It is expected the mills will be in full operation the first part of June.

LOUISIANA.

Monroe.—The Progressive League of this city is forming plans for the organization of a stock company to build a cotton rope mill here.

New Orleans.—The Textile Mills Corporation has been organized with capital stock of $5,000,000. This corporation combines the Lane-Maginnis Mills Corporation and the Mississippi Mills. The president is S. Odenheimer; Maurice Stern, vice-president; W. T. Maginnis, treasurer, and H. T. Howard, secretary.

MAINE.

Brunswick.—The Chabot Mfg. Co. is installing an air washer and humidifying system, of the Bell Pure Air & Cooling Co.

Dexter.—It is reported that the Abbott & Latimer Co. has incorporated, with capital stock of $2,500. R. A. Latimer is president, and A. P. Abbott, treasurer.

Kittery.—The Knapp Spinning Mills have been incorporated with a capital stock of $60,000, to manufacture yarns, etc. H. H. Knapp, of Lowell, Mass., is president, and G. F. Richmond, treasurer.

Lewiston.—The new spinning mill of the Avon Mfg. Co. is completed, and operations will begin at once.

Richmond.—The Richmond Cotton Mill has been purchased by the DeCort Yarn Co., of Boston. The Richmond Cotton Mill has been idle for some time, but it will be put in operation immediately.

MASSACHUSETTS.

Boston.—The Boston Waste Co. has been capitalized at $30,000, for making machine wiping waste. The plant is operated by electricity. Wm. J. Hayes is president and superintendent, and C. H. Hayes is treasurer and purchasing agent.

Fall River.—The buildings of the Beacon-Marrow Fabric Co. are nearly completed. Machinery will shortly be installed, and it is expected to begin operation in May. G. E. Chadwick is treasurer of the company.

Fitchburg.—The Fitchburg Yarn Co. will shortly begin operations. It is equipped with 50,000 spindles for making cotton yarns.

Gloucester.—The Linen Thread Co. is now controlled by the Gloucester Twine Co.

North Adams.—The North Adams Rug Co. recently installed six looms for making rugs. The plant is operated by electricity.

North Adams.—The Mayflower Worsted Co. will shortly begin operations, with 24 broad looms. Walter A. Guile, Sr., is president, and A. J. Buffum is treasurer of the company.

North Adams.—The Windsor Print Works are starting operations again, and indications are that the plant will be running to its full capacity in a short time. The officers of the new company are W. Ferguson, president; Chas. M. Howard, vice-president; and A. L. Ferguson, treasurer. The company has New York offices at 65 Worth St.

Spencer.—The Priscilla Milling Co. has nearly completed work on its buildings, and they expect to begin operations in May. The mills are to be equipped with three sets of cards for making shoddy.

Taunton.—The Taunton River Mill has nearly completed the installation of new machinery, and it is expected the plant will be in full operation in May.

Webster.—The Perry Yarn Mills were recently incorporated, with capital stock of $100,000. The president and treasurer is H. E. Smith.

Worcester.—The Riverside Mills have been organized, and will start operations as soon as possible, with equipment of 14 spinning frames. The capital stock of the company is $50,000. S. B. Roy is president; F. Heath, treasurer, and Wm. T. Kurr, general manager.

MEXICO.

Guadalajara.—The Campania Industrial De Guadalajara, a French concern here, will soon begin the erection of a large mill at this place, to cost $3,000,000. The company now operates a number of large mills in this vicinity, and will combine them all under one roof.

MINNESOTA.

Fosston.—F. A. Patrick & Co. have purchased the Fosston Woolen Mills. These mills are in full operation, and the equipment of the plant will be greatly increased.

Minneapolis.—A new mill will be erected here by the American Kersey Co., for making medium and low-price woolens. S. M. Merrill is president of the company.

NORTH CAROLINA.

Bessemer City.—It is reported that the Southern Cotton Mills will be reorganized at an early date. The creditors of the company appointed a committee to make a detailed inquiry into the conditions of the business.

Biscoe.—The Francis Cotton Mills have completed building operations and are installing over 7,500 spindles for making yarns. Electric power will be employed for operating the mills.

Cannopolis.—The Cannon Mfg. Co. have nearly completed their new mill. J. C. Leslie will be manager and the company will manufacture sheet, cannon cloth and yarns.

Cherryville.—The Howell Mfg. Co. will erect a 5,000 spindle mill. The company has been organized with capital stock of $100,000. A. W. Howell is president; A. H. Huss, secretary, and J. C. Bullard, treasurer.

Cornelius.—The Gem Yarn Mills Co. will begin operations about June 1st, with an equipment of 5,000 spindles. J. B. Cornelius is president of the company.

Dallas.—It is reported that the Monarch Cotton Mills will shortly begin operations for making single hosiery yarns. The plant will be equipped with 4,100 spindles. M. E. Carpenter is president; S. A. Wilkins, vice-president, and R. S. Lewis, secretary and treasurer.

Fayetteville.—It is reported that a 10,000 spindle cotton spinning and weaving mill is to be built at this place. The property was recently purchased, and it is stated the amount paid by the new company was $25,000. The site covers over 100 acres and is located on the Little River, where there is a fine water power, capable of developing several thousand horsepower, of which over 500 horsepower is already developed. W. E. Kindley, S. H. McRae and W. D. McNeill are the principal stockholders of the new company.

Granite Falls.—The Granite Cordage Co. has been organized for the purpose of making cordage. 75 machines will be installed. O. A. Robbins is president, and A. A. Shuford is treasurer of the company.

Lenoir.—We have been informed that the Whitnell Mfg. Co. has been incorporated with a capital stock of $100,000. It is reported that they will install 6,000 spindles.

Lumberton.—The Dresden Cotton Mills expect to begin operations in April. Machinery is now being rapidly installed.

Milledgeville.—The Milledgeville Mfg. Co., capitalized at $100,000, have purchased the plant of the Elderado Falls Cotton Mill, which is equipped with 8,000 spindles for making yarns, twines and cordage.

Monroe.—The Everett Cotton Mills have about completed arrangements for building a plant with a capacity of 7,000 to 8,000 pounds weekly. Chas. Iceman is president; W. S. Lee, vice-president; and J. L. Everett, secretary and treasurer.

Mooresville.—The Dixie Cotton Mill Co. have started work on their new plant. Machinery, motors and all other equipment have been purchased. E. W. Brawley is president and H. N. Howard, secretary and treasurer.

NEW HAMPSHIRE.

Dover.—The Cocheco Mfg. Co., whose plant was recently destroyed by fire, will be rebuilt. When building operations are completed, it is intended to operate a day and night force of 8 hours each, providing employment for those formerly at work in the plant destroyed.

Nashua.—The Nashua Mfg. Co. have installed 106 looms in their new weave room. It is expected the carding and spinning rooms will be in full operation in May. When the company is in full operation, it will have a total equipment of about 1,200 looms. Machinery is now being rapidly added to nearly every department.

NEW JERSEY.

Midland Park.—We have been informed that the Holt Bros. Silk Co. has been purchased by the Norfolk Silk Co., of Norfolk, Va. The Holt mill has been idle for many months, but will be operated as a branch mill immediately.

Newark.—The Essigs Embroidery Co. has been incorporated, with capital stock of $40,000. E. Bellingrath, Herman Baumert and W. Hagman are interested.

Paterson.—The Eureka Silk Dyeing Co. has been incorporated with $50,000 capital stock. D. J. Birchenough, A. Coirrin and J. Walton are interested in the new company.

Paterson.—The Modern Silk Co. has been incorporated with a capital stock of $100,000. It is proposed to build a plant of 2,500 spindles to manufacture silk.

Union Hill.—The Textile American Embroidery Co., manufacturing embroidery, has incorporated with $10,000 capital stock. Lewis Karrier and L. A. Hildergrade are interested in the company.

NEW YORK.

Cohoes.—The dyeing plant of Duncan & Baillie has been purchased by Albert Musgrave, and he will continue operating the same.

Jamestown.—The Enterprise Worsted Mill is in full operation, with 20 looms. The Enterprise Company is located in the old Towel plant formerly run by Hall-Guifford & Co.

New York City.—The Taylor Textile Mfg. Co. are erecting a large fire-proof mill at Bronxwood Avenue and 21st Street, to manufacture broad silks. The office of the company is at 41 Union Square.

New York City.—The Gutta Percha & Rubber Mfg. Co., 126-128 Duane St., have ordered a number of large looms for the manufacture of heavy duck sheeting and drilling, of which they use considerable. It is expected they will be in full operation about June 1.

New York City.—A new mill is being erected at Jersey City Heights, N. J., for Grossenbach & Fimple, of 42 Barnes street. They will remove their entire equipment to Jersey City Heights shortly. They will manufacture braids and millinery trimmings.

New York City, (West Hoboken).—The output of the Schmidt & Meurer Silk Mfg. Co., recently purchased by the Mistletoe Silk Co., will be greatly increased. It is reported new machinery will be installed, also a large addition will be built.

Poughkeepsie.—The Ideal Linen Mesh Co. has incorporated, with $20,000 capital stock, to make linen and cotton mesh cloth and underwear. Wm. I. Cavan and W. A. Lawrence are interested.

Schagticoke.—The Schagticoke Woolen Mill, which is in the hands of a receiver is still in operation, and it is reported a new company will be formed to continue operating the mill.

Seneca Falls.—The Gleason Knitting Mill is for sale to close up an estate. The buildings cover 65,000 feet floor space, and the principal structures are two stories high.

Utica.—The Frankford Textile Co. has been incorporated recently. Cotton and woolen yarns will be manufactured. B. M. Crouse, Wm. F. Harris and W. W. Lowery are interested.

Waterford.—We have been informed that the Ormsby-Moore Co. has been incorporated with $10,000 capital stock to manufacture textile goods of all kinds.

PENNSYLVANIA.

Allentown.—The Queen City Silk Co. will shortly be organized to manufacture ribbons. The new plant will start operation about May 1st. 100 looms will be installed. L. E. Schimpf, J. S. Mack and Jno. A. McCollum are interested in the new company.

Chester.—We are informed that the Fearless Textile Co. has purchased the Grove Mills here and will build a weaving mill for making fancy worsted goods. About 75 broad looms will be installed.

Doylestown.—The Clear Springs Worsted Mills have been leased for 5 years by Wm. Lund & Son. They have 1,372 spindles at Camden, and will operate over 1,400 at the Clear Spring Mills to make shuttle bobbins.

Lansdowne.—Wm. Hall & Co., whose shoddy mill was recently destroyed by fire, will rebuild at once. Plans are already being prepared.

Philadelphia.—Wolstenholme & Clark Co. will shortly install 700 new spinning mules. They will then have a total of about 15,000 spindles.

Philadelphia.—The Philadelphia Felt Co. has moved its plant to Powder Mill Lane & Frankford Creek. They will have facilities there for doubling the present capacity of the plant.

Philadelphia.—Jas. Taylor, dealer in knitting mill machinery, purchased at a recent auction nearly all the machinery of the S. B. Ferguson plant. Mr. Taylor will dispose of the machinery in small lots to suit buyers.

Philadelphia.—The coning plant of A. R. Matthews, 812 Winter street, has been purchased by Messrs. Upham Bros. & Co., well known manufacturers of sewing threads, at 241-245 Arch street. They are now removing the machinery of the Matthews plant to their present address, and we are informed that they are now in a position to handle all orders for coning and tubbing.

Philadelphia.—The Angola Dyeing Co. have had plans prepared for a new building at Front & Somerset streets. This structure will be two stories, with a two-story power house. The company will be located in Philadelphia, and it is expected the entire plant will be in full operation about June 1.

Reading.—We are informed that the Reading Dyeing Co. will shortly be incorporated with a capital stock of $25,000, and will equip a new plant. Max Thus, W. H. Brehm and Chas. Stehle are reported as interested.

RHODE ISLAND.

Alton.—The Alton Mfg. Co., capitalized at $700,000, will begin operations about May 1st, making trimmings, laces, etc. J. O. Curry is president; Wm. F. Weyburn, treasurer, and Chas. W. Shepherd, manager. Later on the new plant will be equipped with a dye house.

Pascoag.—The Hawthorne Worsted Mill recently installed 26 new looms, and is now running to its full capacity.

SOUTH CAROLINA.

Iva.—It has been reported that the new plant of the Jackson Cotton Mills is in full operation.

Rock Hill.—The Aragon Cotton Mills are nearly completed, and it is expected the plant will be in full operation about August 1st.

Woodruff.—W. S. Gray & Son, who propose building a new mill here, will have an equipment of 10,000 spindles.

Yorkville.—We are informed that the Neely Mfg. Co. contemplate installing 2,000 additional spindles.

TENNESSEE.

Newport.—The Bellevue Cotton Mill is about to begin operation with 5,000 spindles, and will manufacture single yarn on cones. C. F. Boyer is proprietor.

TEXAS.

Caldwell.—We are informed that a large cotton mill will be built at this place. It is proposed to organize a company with $50,000 capital stock.

Celeste.—Britton Bros., of Chicago and Dallas, have purchased the Perron Cotton Mills. These mills will be put in operation at once and it is the intention to double the capacity of the plant.

Hillsboro.—1,000 new spindles will shortly be installed in the Hillsboro Cotton mills. This company manufactures all widths of duck, and we are informed they are running to their full capacity.

LaGrange.—Plans are under way to build a large cotton mill at this place. J. P. Ehlinger, J. B. Holloway and Hugo Ehlers are interested.

Knitting Mills.

CONNECTICUT.

Blastonbury.—The Blastonbury Knitting Co. will shortly build a brick building 20x30 feet, to be used as a new engine room.

GEORGIA.

Hampton.—The Henderson Mfg. Co., will shortly erect a spinning plant in connection with their knitting mill, and the same will be rapidly pushed to completion. Machinery is now being contracted for and they expect to have new mill in operation about November 1st.

NEW YORK.

Averhill.—The Faith Knitting Mill will increase its capital stock from $60,000 to $100,000. This was decided upon at a recent meeting of the directorate and stock holders. The company proposes to enlarge the plant at once.

Cohoes.—The Victor Knitting Mills Co. will shortly put in a large number of new carders of the three beater type. This is necessary, because the mills are running up to their full capacity and are operating night and day to keep up with present orders.

Cohoes.—The Mohawk River Knitting Mills will shortly erect a two story addition which will considerably enlarge the capacity of the plant. The main plant of this concern is located at Troy, N. Y., and is known as the Aetna Mills. The president is S. Wright, and the superintendent is S. Wright, Jr.

Cohoes.—The Electric Knitting Co., has changed ownership and the present firm is made up of L. O'Lena, John Crooney and Edgar Nichols. About a month ago the old firm was dissolved and the new one inaugurated. The product of the company will remain practically the same, but the capacity will be considerably increased as soon as everything is in running order. New machinery will be installed and a large force of hands will be employed. It is expected that the plant will be in operation about May 1st.

Little Falls.—The Ostrander Knitting Mill has outgrown its present quarters. Mr. Ostrander will shortly begin the erection of an addition to his present factory, which will double the capacity of the present plant. The new addition will be a three story frame building 60x30 feet, plans for which have been prepared by Arthur K. Haug. Work on the addition will begin in a short time.

Warsaw.—George Clark of Amsterdam, N. Y., has purchased an interest in the new knitting mill at this place, which will soon be reopened. New machinery will be installed, and instead of it being a hosiery mill as heretofore, cotton underwear will be manufactured.

NORTH CAROLINA.

Burlington.—The Daisy Hosiery Mills are installing 18 new standard knitting machines and others will be added at an early date. It is the intention of the management to greatly increase the capacity of the mill to more nearly supply the demands for their goods.

Graham.—J. C. Simmons of this place is considering the establishment of a knitting mill at some good point in Georgia.

Hendersonville.—A new knitting mill will be erected this summer

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on the Southern Railroad about three miles from Hendersonville, N. C. It is hoped to have the mill in operation some time in the fall. A. R. Calvert of Spartanburg, N. C. is interested.

Monroe.—The Crow Hosiery Mill Co. is planning to erect a new mill and equip it with modern machinery.

MAINE.

Kittrey.—The Knapp Spinning Mills have been incorporated here with a capital stock of $60,000. They will manufacture yarns of wool, cotton, etc. H. P. Knapp of Lowell, Mass., is president.

MASSACHUSETTS.

Taunton.—The Taunton Knitting Co. is preparing to enlarge its plant by an addition on account of increase in business. The foundation for the addition has already been laid.

PENNSYLVANIA.

Scranton.—Scranton Hosiery Mills, incorporated at $50,000, operate 85 knitting machines. We are informed that they intend very shortly to add very materially to the number of these machines. The plant is also equipped with a dye house and mill to operate it by steam.

Reading.—Chas. Herbin, formerly with the Pennsylvania Knitting Mill at Reading, contemplates engaging again in the knitting business in the near future. He will probably be located in Reading, but he has not fully decided as yet.

VIRGINIA.

Roanoke.—The Roanoke Knitting Mills are increasing their capital stock to $100,000, so we are informed, and are making arrangements to start branch mills at Martinsville, Luray, and Pulaski. It is the intention to install 150 machines at each place. They will erect a dye plant and finishing department at the Roanoke mill, where all dyeing and finishing will be done.

Williamsburg.—The Williamsburg Knitting Mill is reported as about to build a 16x85 foot addition and to install new spinning machinery.

WISCONSIN.

Milwaukee.—The Everwear Knitting Co., of this city, will increase its capital stock from $20,000 to $40,000. It is the intention to add a number of new buildings to their present plant and install considerable new machinery.

Personal.

F. S. Klebart recently resigned as superintendent of the Columbiaville Woolen Mill, Columbiaville, Mich., to take a half interest in the J. W. Linnehan Company, Franklin, Mass.

Geo. Dick, formerly superintendent at Beaver Dam, Wis., has been appointed to succeed Mr. Klebart at the Columbiaville Woolen Mills.

William Kennedy has been appointed overseer of finishing at the Mystic Woolen Mills, Old Mystic, Conn., succeeding Chas. S. Cody, who resigned.

Steward J. Smith is now agent of the Ray Mills, Franklin, Mass., succeeding Raymond S. Bartlett, who now holds a position in the Boston office. Mr. Smith was formerly connected with the Burlington Mills, Winooski, Vt.

Alfred Petzold has accepted a position as assistant designer with the Nashua Mfg. Co., Nashua, N. H. He recently resigned a similar position with the Pemberton Mills, Lawrence, Mass.

F. E. Steele recently resigned his position with the Boston Mfg. Co. to accept a position as overseer of carding at the Burgess Mill, Pawtucket, R. I.

William Ferguson has succeeded William Orr as overseer of spooling in the Renfrew Co. Lowell Mill, Adams, Mass. Mr. Orr resigned after 40 years of valuable service.

Alfred Moore, who has been general manager of the Tucapau Mills, Tucapau, S. C., has succeeded Jno. J. Carey, general manager of the Lockhardt Mills, Lockhardt, S. C., Mr. Carey having resigned his position on account of ill health.

J. C. Mason, of Dallas, has been made treasurer and manager of the Kesler Cotton Mills, Salisbury, S. C., succeeding Frank L. Roberts, who has severed his connection with that corporation.

J. L. Grice has been made superintendent of the Belmont Mill at Shelby, N. C. Mr. Grice has been for several years an overseer in the mills at Clover, S. C.

E. O. Hill, for many years overseer of weaving at the Tucapau, S. C., mill, has been promoted to be superintendent of the company.

S. Westall has accepted the superintendency of the Perrin Cotton Mills at Celeste, Texas. Mr. Westall was formerly superintendent of the Ashcroft Cotton Mill at Florence, Ala.

J. T. Collins, overseer of carding for the night shift of Nemasket Mills, Taunton, Mass., has accepted a position in Lowell. Lincoln Robinson takes Mr. Collins' place at Nemasket mills.

William Burrows, overseer of weaving at the Sterling Mills, Lowell, Mass., has resigned after 27 years valuable service. He was requested to remain longer, but declined, feeling that after so many years service he was entitled to rest and retirement.

J. D. Melton has accepted a position as chief engineer at the Lula Mills, King's Mountain, N. C. He was formerly connected with the Cherryville Mfg. Co., Cherryville, N. C.

J. E. Capps has accepted a position as overseer of carding with F. W. Poe Mfg. Co., at Greenville, S. C. Mr. Capps recently resigned a similar position with the Gaffney Mfg. Co., Gaffney, S. C.

W. W. Beckwell, until recently overseer of carding at the Cherry Cotton Mill, Florence, Ala., is now superintendent of the Asheraft Mill at Florence.

Henry Doomus is now overseer of spinning at the Fall River Iron Works Mill, Fall River, Mass.

John E. Hume has accepted a position as overseer of weaving at the Lancaster Mills, succeeding Wm. E. Towsley, who has severed his connection with that firm. Mr. Hume was formerly overseer at the No. 2 Mill of Lancaster Mills and has been succeeded there by Jos. Bradsley and Daniel Grady, who were assistants under him.

H. G. Moore has been appointed to the superintendency of the Magnolia Cotton Mills. Mr. Moore was formerly employed at the Mississippi Cotton Mills for a number of years and is a man of considerable experience.

W. L. Ross, who for several years has been foreman of the woolen department of the Mississippi Cotton & Woolen Mills, has resigned his position and will engage in the manufacture of lumber.

Jos. Bouley is now everseer of carding for the Stanley Woolen Company, Uxbridge, Mass.

Thomas A. Tunney has been appointed overseer of carding for Jos. Noone's Sons Company, Peterboro, N. H., succeeding W. E. Cobbett, who recently resigned this position.

Geo. R. McDougall has been appointed to the superintendency of the Pluckamin Mill at Pluckamin, N. J. This mill is controlled by the Somerville Mfg. Company, Somerville, N. J. Mr. McDougall was formerly overseer of carding at the Hudson River Woolen Mills, Newburgh, N. Y.

Chas. B. Cook was recently elected president of the Algonquin Printing Co., Fall River, Mass., to succeed R. T. Davis.

Frank Plunkett has resigned his position with the Gay Brothers, Cavendish, Vt., and is now connected with the Beaver Brook Mills, Collinsville, Mass.

Daniel Doe has been appointed overseer of the No. 2 mill of the Charles River Woolen Co., North Bellingham, Mass., succeeding John H. Ryan, who recently resigned.

S. A. Lewis has accepted a position at Fall River, Mass. Mr. Lewis was formerly of the weaving at Holbrook Mills, Millsbury, Mass., but resigned this position to go to Fall River.

D. Schofield has been succeeded as overseer of carding at the New Holland Mills, Georgia, by J. Sorrells. Mr. Sorrells until recently was overseer of carding at Gainesville Mills.

Jos. Wood, overseer of spinning at the Tingue Mfg. Co., Seymour, Conn., has resigned his position to take up work at Utica, N. Y.

Jas. H. Fraser has accepted a position in North Adams, Mass., having recently resigned as overseer of weaving for the Terry Mfg. Co., Waterville, Me.

Stephen Edwards has been appointed overseer of carding at the Waterbury Mills, Oriskany, N. Y. Mr. Edwards was formerly boss carder of the Waterbury Mill.

M. H. Hurl, formerly employed at Fall River, Mass., has taken a position as second hand of the mule spinning of the China Mfg. Co., Suncook, N. H.

George Waterhouse has left the Clinton Woolen Mill to accept a position as overseer of weaving at Reedsburg, Wis.

William Carter, President of the William Carter Company, Highlandsville, Mass., recently celebrated the fiftieth anniversary of his entry into business in America. Mr. Carter operated the first foot power knitting machine brough from New England. He now has two goods center. Mr. Carter is 77 years of age, but still remains active unmense buildings in Highlandsville, which has become a large knitting in business and social life.

Mr. J. E. Brinker, of Mankato, Minn., has accepted a position as overseer of carding at the Appleton Woolen Company, Reedsburg, Wisconsin.

Edward Reynolds has accepted a position at the Martinsburg Woolen Mills, Martinsburg, W. Va., as overseer of finishing.

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D. L. Arnold, of Holyoke, Mass., has been appointed to take complete charge of the weaving of the American Felt Company, Glenville, Conn.

Chas. H. Ashworth, formerly of the Stanley Woolen Company, Uxbridge, Mass., has been appointed overseer of spinning for the Assawauga Co., Dayville, Conn., to succeed Thomas H. Igo, who has resigned. Mr. Igo was presented by the men in his employ with a handsome fob chain and an opal ring. The management as well as the men in the spinning department regretted Mr. Igo's resignation very much.

W. H. Rice is now manager of the Urbana Woolen Mills, Urbana, Ohio.

Jas. A. Young has accepted a position in the office of the Whitin Machine Works, Whitinsville, Mass. Mr. Young was formerly bookkeeper and paymaster at the Linnwood Mills.

Chas. A. Byington has been appointed to take charge of the Kendall Knitting Company, Utica, N. Y., succeeding W. A. Clark, who has become superintendent of the Ontario Knitting Co., Oswego, N. Y. Mr. Byington until recently had charge of the Regal Textile Mill at Syracuse, N. Y.

John Weeks, formerly connected with C. B. Alling, Derby, Conn., has become overseer of carding at the Beaver Brooks Mills, Cillinsville, Mass.

Mr. N. H. Hall has been appointed overseer of finishing at the Pioneer Woolen Mills, succeeding Jos. Carter who recently resigned.

Chas. S. Bottomley, who has been superintendent of the New England Mills, and Frank Eastwood, formerly superintendent at Hockanum Mills, have exchanged positions.

Jos. Keefe has accepted a position as overseer of dyeing at Seneca Woolen Mills, Seneca Falls, N. Y. Mr. Keefe was formerly overseer at the Clinton Woolen Mfg. Co., Clinton, Mich.

J. H. Fraser, of Lowell, Mass., has been appointed to the position of overseer of weaving at the Adams Woolen Mill, Maplesgrove, Mass., succeeding Daniel Paro, Jr. Mr. Paro is now overseer at the Maplesgrove Worsted Company, of North Adams, Mass.

Philip Sine has resigned his position as overseer of carding and spinning at the Renfrew Mfg. Co., North Adams, Mass. He is succeeded by T. O. Malley. Mr. Malley was formerly employed at a large mill at Hebronville, Mass.

W. W. Crosby has become identified with the firm of F. W. Dean, mill engineer and architect, Boston. Mr. Crosby was formerly principal of the Lowell Textile School.

Sydney Hopkins is now overseer of spinning for the Mohawk Valley Cap Factory, New York City. He was formerly superintendent of the Oneita Yarn Mills, of Utica, N. Y.

W. H. Burwood has resigned his position as overseer of spinning at the Madison Woolen Mill, Madison, Maine, and has been succeeded by Albert Foster, formerly employed at the Indian Spring Mills, of Madison.

Thomas H. Kinney has resigned the position of superintendent of Fichter & Martin Silk Mills at Bethlehem, Pa., and has been succeeded by John Bernhardt.

Chas. H. Bottomley, who has been superintendent of a number of cotton mills for the past ten years, has recently been appointed superintendent of the Hockanum Mills, Rockville, Conn.

H. G. McFalls recently resigned his position with the Harden Mill at Worth, N. C., to accept the superintendency of the Levi Mills at Rutherfordton, N. C.

Benjamin A. Anderson, who for the past 18 years has been connected with the Firth & Foster Company, Philadelphia, has resigned to become identified with the Nicetown Dye Works.

J. A. McLaughlin, who recently resigned his position as overseer at the Hadley Thread Mills, Hadley Falls, Mass., is now superintendent of the New Burgess Mill at Pawtucket, R. I.

Geo. Sheldon is now engaged with the Endfield Mfg. Co., Endfield, Mass., as overseer of weaving. He was formerly engaged with the Swift River Co., at Smiths, Mass.

We are informed that James A. Barnett, formerly connected with the Darling Woolen Mills, Holliston, Mass., has been offered the superintendency of the Talcott Bros. Mills, Talcottville, Conn.

Chas. G. Tait is now superintender and designer for Robt. H. Shaen of Philadelphia. Mr. Tait was until recently connected with the Riverside Mills, Pittsfield, Maine.

Morris H. Snow has resigned his position at the Hillsboro Woolen Company, Hillsboro Bridge, N. Y., and accepted a position as overseer of weaving at the American Felt Mills, Glennville, Conn.

Help Wanted
and
Situations Wanted.

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Superintendent of knitting mill. Ten years' experience in English and six years in American hosiery factories. 40 years old. References from present employer who is closing mill. Address 3, care Cotton.

Superintendent of cotton mills now employed in North Carolina. 35 years old, can give good references. Fifteen years' experience. Familiar with Draper, Whitin and Crompton & Knowles looms. Single and will accept position anywhere—North or South. Address 4, care Cotton.

Boss Weaver in Woolen Mill desires position. Worked on cotton and woolen warp goods, sheetings, shirtings and ducks. 38 years old, American, married. First class recommendations. Address 14, care Cotton.

Bleacher and Dyer desires position in large mill in the South. 32 years old. Has worked on cotton and worsted yarns and worsted piece dyes. Now employed in Vermont but desires to come South. Can furnish good references, and accept position on short notice. Address 15, care Cotton.

Second Hand in Woolen card department. Position wanted by a man who has had 4 years' experience. 28 years old. Worked on all kinds of stock. Will accept position anywhere. Address 16, care Cotton.

HELP WANTED.

Superintendent of small cotton mill located in Georgia. Must be thoroughly experienced and a married man, not over 40 years of age. Must be able to give best of references. Address 5, care Cotton.

Superintendent of cotton mill. Must be thoroughly experienced and have best of references. Graduate of a textile school preferred. Must be familiar with and able to handle Southern labor. Send copies of references, state age and experience and pay wanted. Address 6, care Cotton.

Engineer for cotton mill in North Carolina. Must understand McIntosh-Seymour engines and be able to handle electric lighting machinery. Must be sober and capable; no night work. Wages, $100.00 per month. Address 7, care Cotton.

Designer in Louisiana Knitting Mill wanted who has had at least four years experience on men's wear and ladies' dress goods. Married man preferred about 35 years of age. State where last employed and send references. Address 8, care Cotton.

Overseer of Knitting in Hosiery Mill. Give references and number of years experience. One who is familiar with Lamb Champion and Leighton Knitting Machines preferred. Ability to handle help and getting out the product quickly and neatly. Single man desired, about 40 years old. Address 9, care Cotton.

Boss Finisher wanted to work on cheviots, broad cloth, thibets, meltons, piece dyes and dress goods. One who is familiar with all makes of finishing machines. Give references, age and state whether married. Address 10, care Cotton.

Overseer of Cotton weaving wanted. Must be experienced on cambrics, sateens, carded goods and prints. Also must be familiar with Whitin, Draper and Lowell looms. State age and give references. Address 11, care Cotton.

Designer wanted. One who is a graduate of a Textie School and has had some practical experience on cotton goods, woollen and worsted dress goods. Preference given to man who is familiar with Crompton & Knowles looms. State age and name of school. Address 12, care Cotton.

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